MARINE REVIEW.

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Several Nice Questions in Admiralty.

In November, 1892, the steamer F. & P. M. No. 2, bound on a voyage from Duluth to Ogdensburg with a cargo of flour, bran, etc., was stranded about six miles west of Long point light, Lake Erie, and herself and cargo greatly damaged. Underwriters on the hull refused to pay, claiming that the vessel was unseaworthy and the loss was not within their policy. An action was brought in the United States circuit court for the eastern district of Michigan, and was tried before Judge Swan and a jury, and the court directed the jury to return a verdict for the defendants, on the ground that the vessel was unseaworthy in that she was without a proper lookout, and as to the condition of her rudder, these being the proximate cause of the stranding and loss.

It is the underwriters' turn now, and a short time since the F. & P. M.No. 2 was libeled in the United States district court at Milwaukee by the Union Marine Insurance Co., underwriters on cargo, claiming among other things that the loss to cargo, which the company paid, was caused by the negligence of the vessel, and seeking to recover from the vessel under its subrogation right. Several nice questions, not entirely new, but in somewhat differing form, will receive consideration in this case, it appearing that under the bills of lading the carrier stipulated for the benefit of any insurance; but it also appearing that the policy of insurance provides that "any act of the insured, waiving or transfering , or tending to defeat or decrease" the insurer's right of subrogation against others "whether before or after the insurance was made under this policy, shall be a cancellation of the liability of the company, for or on account of the risk insured for which loss is claimed."

The underwriters did not avail themselves of this provision of their policy, but paid the loss, and now bring their action as above. With these conflicting provisions of the bill of lading and the policy of insurance—the issuance of the insurance antedating the bill of lading—it will be interesting to see what the court does with the claim of the underwriter under his right of subrogation. Another provision of the bill of lading is that claim for loss must be made within thirty days, and any action on such claim must be brought within three months after the loss or damage occurs.

These various provisions in the contracts of carriage, under which, by virtue of their right of subrogation, the underwriters must proceed, and the provision referred to in the policy, make a somewhat complicated case, the determination of which will be of interest. All of these questions have been before the courts before, but under varying facts. When losses, as in this case, are first adjusted in general average and some time necessarily consumed, it would seem unreasonable that an owner or his underwriter could not safely wait the adjusting of the loss and opportunity to settle in that manner without taking the risk of barring his claim, if, as many times happens, more than three months intervenes between the date of loss and refusal to accept the adjustment.

An accident to the Detroit Dry Dock Co.'s big shears at the Orleans street yard will result in quite a little loss to the company. Through a misunderstanding of engine signals, while lifting a cylinder weighing about four and a half tons, certain parts of the machinery was broken, causing the shears, which weigh about forty tons, to topple over and fall flat to the ground. The cylinder that was being lifted was not injured.

An advertisement elsewhere in this issue from Maj. W. L. Marshall of the army engineer corps, who is in charge of river and harbor improvements in the Chicago district, calls for bids on about 1,300,000 cubic yards of dredging. This seems to be a contract large enough to bring out some low bids. Proposals will be opened at noon, Oct. 24.

On this date a year ago, Oct. 1, the rate on ore from the head of the lakes to Ohio ports was advanced from $1.40 to $1.50 and few vessels were to be had at the advance.

Sales of Ore and Pig Iron.

Within the past ten days leading iron firms in Cleveland that deal in ore and pig iron have made sales equal to the business of the same firms for ninety days previous. The sales have been confined almost entirely to non-Bessemer ore and foundry pig iron, and prices have not been governed by the schedule fixed early in 1896 for Bessemer ores, but a movement of any kind in ore or pig iron at this time is an indication of immediate improvement in event of business confidence being restored in the coming election. Unfortunately, these sales are coming too late to be of any assistance in the lake trade during the balance of the present season, and the extent of sales thus far is not sufficient anyhow to cause an increase in the amount of ore to be brought down. Producers of Bessemer ores are still holding to the prices established early in the spring. If there is any improvement in the iron market during the fall and winter, more ore will be wanted than has as yet been sold, and the result should be a fair profit on sales from dock.

Marcus A. Hanna.

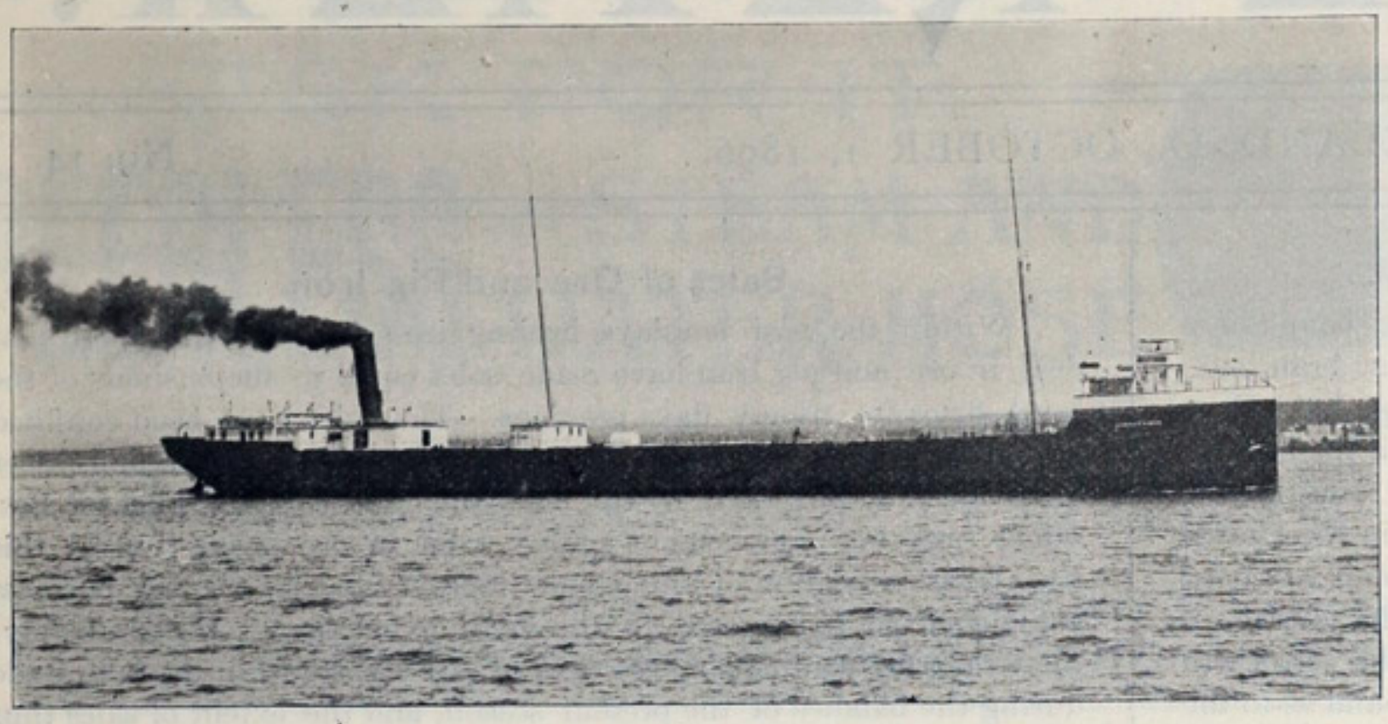
Serene in the midst of the confidence that all is well, Mr. Hanna, in his smiling, clean-shaven, and clear-eyed composure, more apprehensive of an overdrawn sense of security than of alarms, vibrates between the city of commerce and the city of conventions, collected and vigilant as the engineer who manages the engines of a twin-screw steamer, confidant that if there is no relaxation in well-doing no tempest can come out of the skies south or east or west to stay the course of the ship safely to the port that the chart and compass tell is right ahead. Mr. Hanna is the new man in politcs, the man of affairs of his own, finding time for unofficial business. This is not of evil; there is not a better sign of better things. The element of which Mr. Hanna is a type is needed to stand firmly for the balances of power with which the fathers conserved the republic—and this representation of the ancient civic and national pride in our government under the constitution as it is, has not come to us without a cause, or appeared too soon; and when the contest is over and won, Mr. Hanna will deserve well of his country that he is serving for the sake of principle with motives and for consideartions, that contemplate only his fair share, as a laborious and faithful citizen of the general welfare.—Murat Halstead in October Review of Reviews.

Counsel Harvey D. Goulder of the Lake Carriers' Association has just completed papers relating to fines imposed on a large number of vessels that are charged with violation of Sault river regulations, and in the interest of which he made a trip to Washington some time ago. It is expected that only nominal fines will be collected of these vessels, but in cases where owners have settled with the department, paying say $50 or $100 where $200 or more was the fine, there can be no rebate of amounts thus paid. A case of this kind once settled could only be reopened by an act of congress, as the money goes into the treasury.

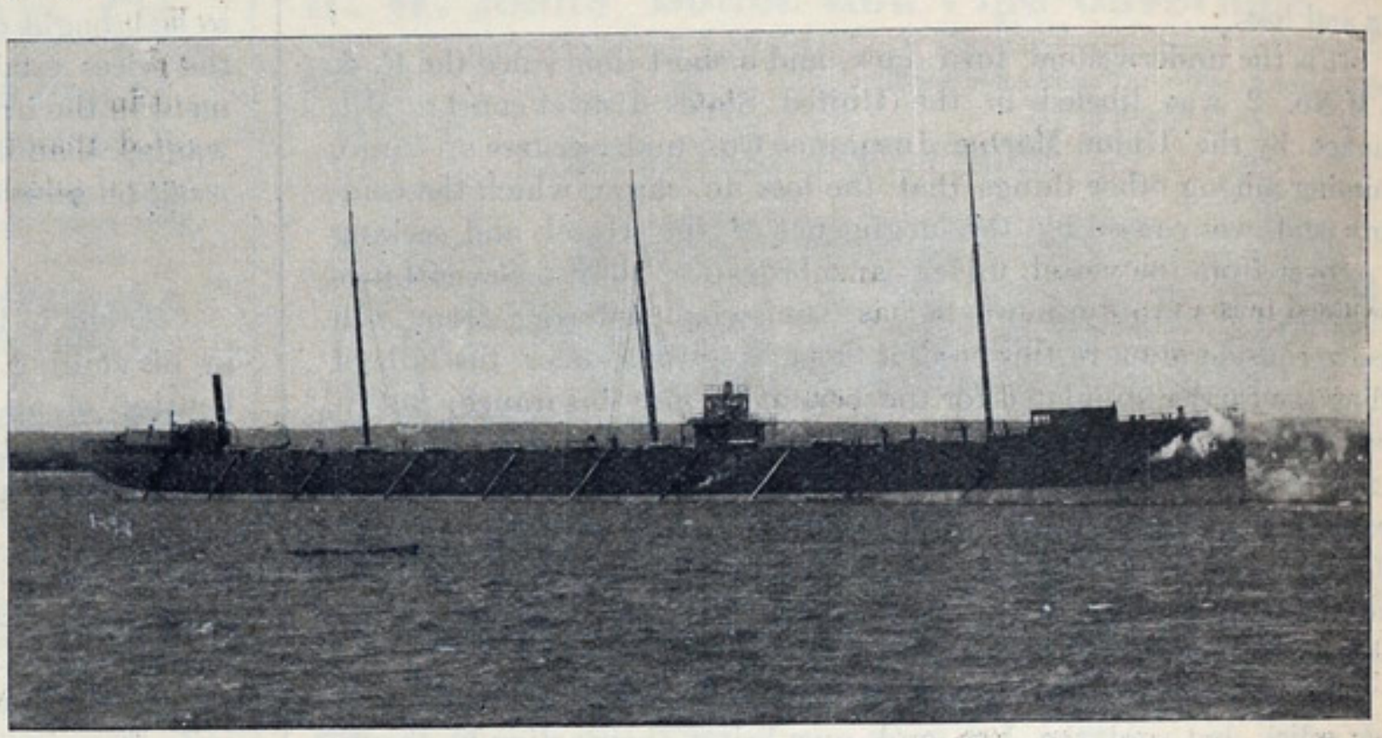
Tom L. Johnson of the Johnson Steel Co. says that his company has sold only $1,800,000 of its bonds, and he knows pretty well where they are, so that he can not see how John D. Rockefeller might hold the bonds to the extent of two and a half millions. It is the opinion among people best posted in the iron business here that Mr. Rockefeller has no intention of taking up the manufacture of iron or steel, unless it might be that he would, later on, establish a blast furnace plant, and in that event Cleveland would very probably be the place selected for such an enterprise.

Capt. T. W. Kirby, ex-mayor of Grand Haven, Mich., and well-known throughout the lakes as a builder of wooden ships at that point, died at Detroit Tuesday. He was stricken with paralysis while on business in Detroit. He was sixty-five years of age and had lived in Grand Haven for about forty years. He was born on his father's sailing vessel in the China sea.

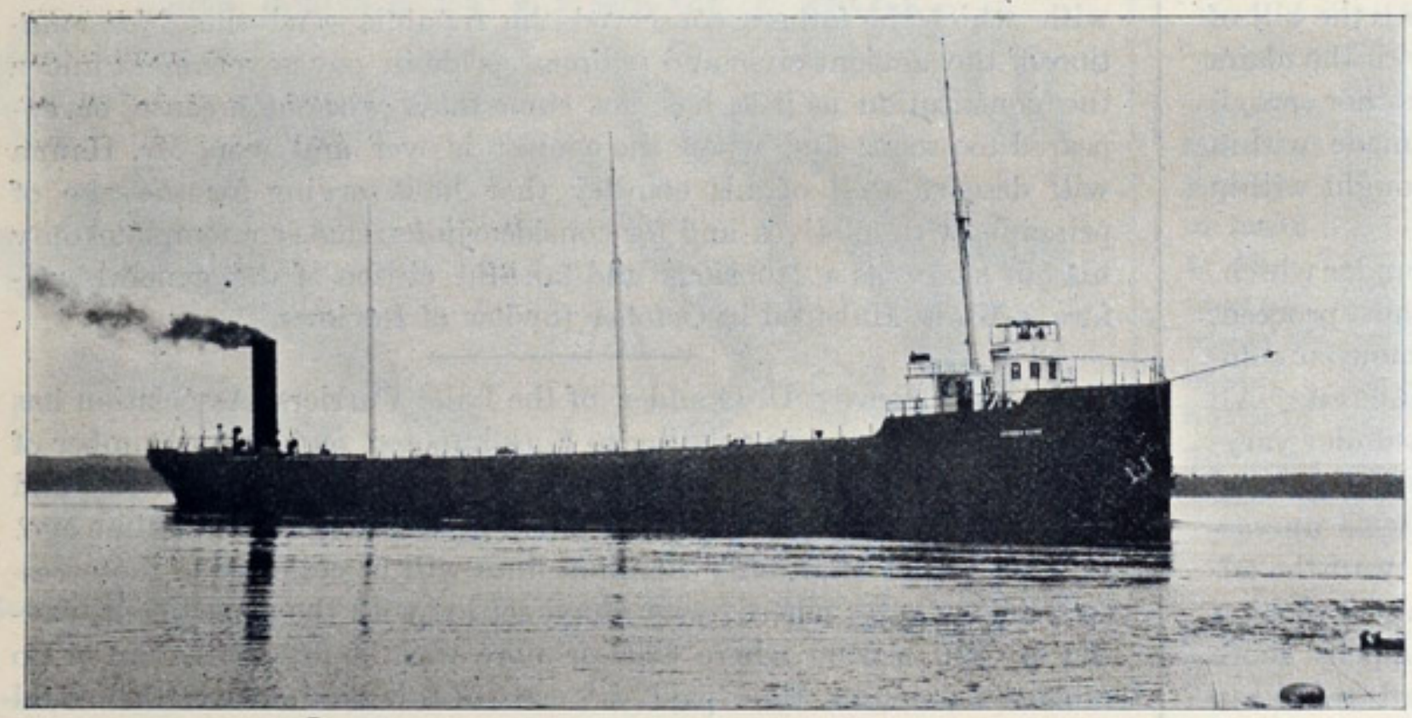
LATEST TYPES OF STEEL FREIGHT CARRIERS ON THE LAKES.



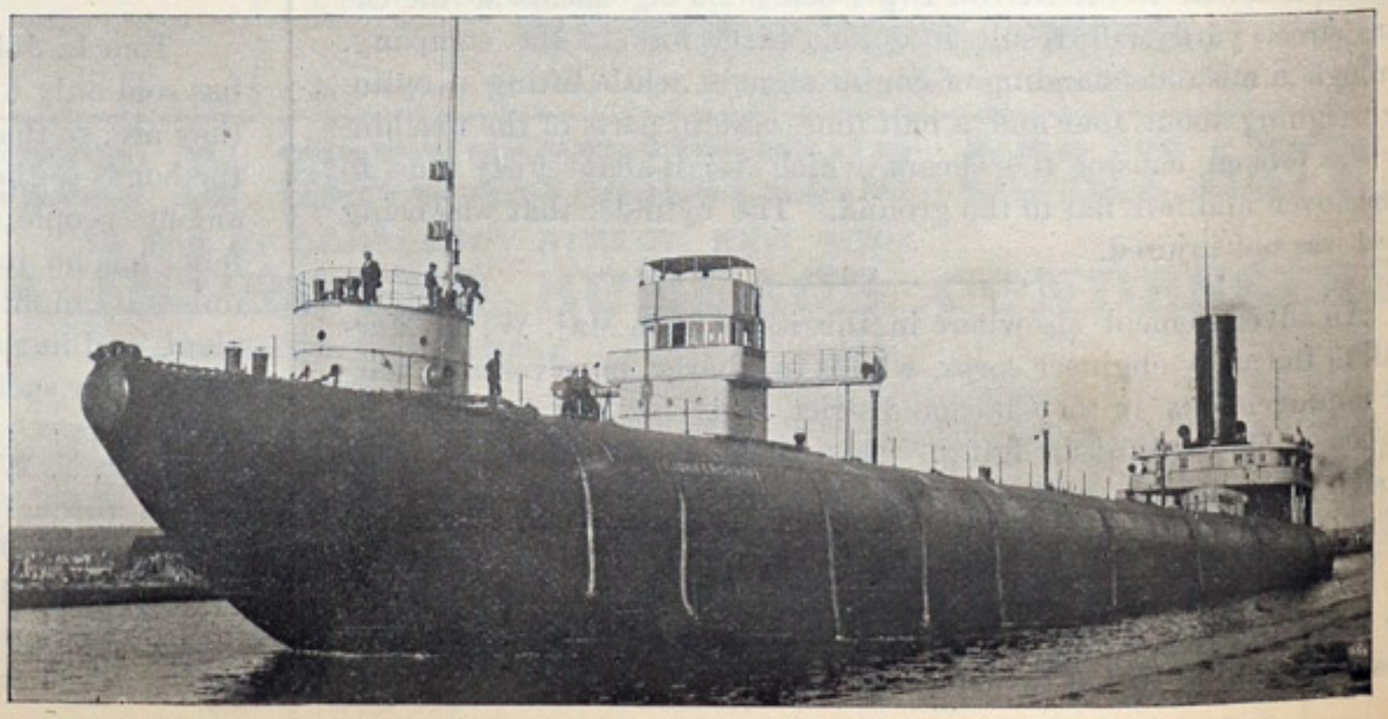
CHICAGO STEAMER GEORGE N. ORR.



GEORGE E. HARTNELL—TOW BARGE OF 4,000-TON TYPE.



STEAMER QUEEN CITY—CAPACITY 207,000 BUSHELS OF CORN.



JOHN ERICSSON—LATEST OF THE WHALEBACKS.

Two Systems of Artificial Draft.

As it is quite evident now that the immediate future has in store for lake ship builders few orders of the Rockefeller kind for twelve boats at a time, the ship builders are looking forward to keen competition and requirements from owners that will have much to do with the question of economy in operating expenses, especially in regard to fuel. Advantage will be taken of all valuable engineering appliances. This is shown by the announcement that the Globe Iron Works Co. of Cleveland, has just made arrangements, through Mr. Charles W. Whitney of New York, for the exclusive right to use and to dispose of the rights to use on the lakes the Ellis & Eaves induced or suction draft. In other words the firm of John Brown & Co., Limited, of Sheffield, Eng., has made with the Globe Iron Works Co., through Mr. Whitney, their representative in this country, the same arrangement that Mr. James Howden, the Scotch inventor, has with the Detroit Dry Dock Co. Mr. Whitney also represents in this country the Purves' ribbed boiler furnace flues and Serve's ribbed boiler tubes, so that this arrangement regarding the Ellis & Eaves draft will probably mean, also, close relations between the Globe company and owners of patents on these boiler specialties. One steamer on the lakes, the Waldo, is fitted with the Ellis & Eaves system of draft.

Now that these lake concerns are representing the two principal systems of artificial draft, it is quite probable that the question of comparative efficiency, as well as the merits of hot draft of any kind over the well-known closed stokehold and natural draft systems, will be discussed here even more than it has been in the past. It is quite generally agreed among engineers that there is a saving of at least 8 to 12 per cent. over natural draft and the closed stokehold in favor of the hot air systems. The Howden hot draft system consists of a series of heating tubes placed vertically in the tops of the coal boxes immediately above the tubes in the boilers, the hot gases passing through them on the way to the smoke stack. At the same time a current of cold air is forced, by blowers, into the heating chambers, which, after being heated to a temperature of from 350 to 400 degrees, passes down the distributing hot air ducts to the furances below, entering beneath the grates, the volume being regulated with damper valves, so as to secure the most perfect combustion possible. The Ellis & Eaves induced or suction draft is the reverse of the Howden, just referred to, since exhaust fans are placed in the tops of the uptakes, sucking the heated air through the boilers instead of blowing it through as in the first case. The mechanical arrangement as to principle is similar in both systems. One special claim made for the induced system is that it makes the more comfortable stokeholds, as the dust and hot air are drawn therefrom through leaks in the casings and through the doors when opening for firing. This is answered by advocates of the Howden system claiming that if care is taken to make the casings and uptakes air-tight with their system no gases will escape into the stokehold.

A Mile Below the Earth's Surface.

Stories told by old-time vessel men of the opportunities afforded to make money on Lake Superior in early days are emphasized by statements of the millions that have since been paid in dividends by such mining companies as the Calumet & Hecla. But the reports of this great copper company's earnings are no more interesting than is a brief statement of its mining operations, recently sent out from the copper region.

It was proposed, in connection with plans for the French exposition of 1900, to dig a hole in the earth to a depth of one mile. Tne idea was favorably received, and it was thought this novelty would attract more attention than the Eiffel tower or the Ferris wheel, but upon investigation the magnitude of the undertaking became so apparent that the idea was dropped. And yet within a mile of each other at Calumet, one of the small towns of the Michigan copper region, there are three vertical mining shafts, each nearly one mile in depth. The deepest of this trio is the Red Jacket shaft of the Calumet & Hecla mine, which has reached its full depth of 4,900 feet. Five Eiffel towers could be dropped down this hole were it wide enough, and the top of the fifth would barely reach the surface. This shaft was begun in 1889, and it has taken seven full years to sink it, showing an average progress of 700 feet annually, nearly all of which has been in blue trap rock, one of the most refractory of minerals. The conglomerate carrying copper was the bed of an ancient sea, and is composed of pebbles and gravel worn by the action of the water, such as are seen on sea beaches or lake shores, cemented into a solid mass by calc and silica. By the percolation of the waters and the decomposition of certain constituents of the rock little cavities were formed, in which were deposited small nodules of copper by the water.

The Red Jacket shaft is 15½ by 25 feet in size inside of the timbers, and contains six compartments, being fully equal in working capacity to half a dozen mining shafts of ordinary size. The shaft is solidly timbered. The adamantine firmness of the rock renders it secure for all time to come, the timbering being merely to carry the traffic of men and mineral, of water and electricity, which surges between the sunlight and the bottom. In four compartments slip up and down the ponderous cages, carrying ten-ton loads of rock at the speed of express trains. Up and down those cages also ride the men who mine the rock from the old sea bed. In one compartment are the great iron pump pipes, and down another descends the steady current of compressed air which runs the drills a mile below the engine house. Bunched in slender cables are the copper wires which convey electricity to light the recesses of the mine, threads of wire that afford telephone communication from the most remote drift to any other portion of the property, for the Calumet & Hecla has a telephone exchange of its own, which in size and perfection of equipment puts to blush the facilities of many pretentious towns, and which reaches every office on the surface and every portion of the great mine.

There are fire alarm wires, too, for the Calumet & Hecla spares no cost to make its employes as safe as skill and lavish outlay of money can render them.

The sinking of this shaft possesses deep interest from a scientific standpoint. Observers ascending to great heights in baloons have been able to secure data of surpassing importance regarding meteorological conditions, and observations made at the depth of a mile afford positive information. The Red Jacket shaft has shattered some of the deeply cherished theories, and there are text books now extant in the higher institutions of learning which must be overhauled because facts have succeeded theory. The mines of the Comstock lode in Nevada were the deepest in the world. The mines were very hot, and on the deeper levels some of the more pious miners were quite positive that they smelled sulphur and refused to go further down for fear of encroaching upon the dominions of the devil. According to deductions the bottom of the Red Jacket shaft should be about the proper temperature to boil eggs. Careful tests have determined that the normal temperature of the rock is 87.6 degrees Fahrenheit at the bottom. The rock temperature at the depth of 105 feet was 59 degrees Fahrenheit, showing a difference of 28.6 degrees in 4,795 feet. There was, however, a gain about 8 degrees of temperature in the last 500 feet sunk, a much more rapid increase than at lesser depths.

Notwithstanding the beneficial effects of ventilation and compressed air, men working at the bottom of the deep shaft do not have an especially easy berth, though liberally paid. They are compelled to wear rubber boots and rubber coats, as the water found in the mine at that great depth is most corrosive on the human body. There is machinery enough on the surface at this single one of the company's eleven shafts to drive all the street cars of a city like Cleveland.

Employes of lake ship yards who are connected with the Brotherhood of Boiler Makers and Iron Ship Builders have fully organized their district council, taking in all branches on the lakes. This district organization includes local unions at Chicago, South Chicago, Cleveland, Detroit, Wyandotte, Bay City, Port Huron, West Superior, Duluth, Buffalo, Erie, Toledo, Milwaukee and Racine. Following are the district officers: President, H. L. Molach, Wyandotte; first vice-president, M. W. Gibson, Buffalo; second vice-president, W. J. Holden, West Superior; third vice-president, J. Gilfoyle, South Chicago; secretary-treasurer, Louis Hall, Cleveland.

Attention is called to the liner exchange on page 23 of the Review. This space is free to our advertisers and subscribers, and has been used 361 times since it was started. It has been the means of selling considerable machinery. The offer of two 6x8-inch deck hoists at prices to suit present freight conditions ought to bring a number of replies.

The Nickel Plate road offers excursion rates to points in Wisconsin, Michigan and the southwest for hunters. 338 Nov. 1.

Steam Yachts and Water Tube Boilers.

Editor Marine Review:—Since I addressed to you my letter of August 18, discussing the Enquirer-Say When yacht race, a number of comments have appeared, which you will permit me to answer, and to correct in cases where the conclusions drawn were based on mistaken data given by me or assumed by others who have written you on this subject. I had taken the dimensions of the Say When's engines from a table published by Mr. Roberts, and while Mr. Fairburn has stated the dimensions more accurate, I will now state in inches the actual size given to me from headquarters, viz., 14 1-4, 16 1-2, 22 1-2 and two 22 1-2 by 15 stroke. From Mr. H. H. Taylor I received a letter in which he says: "Your statement in the Marine Review of the weight of my boiler in the steam yacht Enquirer must have included the water, as the empty boiler, including grates, had an actual weight of only 19,100 pounds. You will kindly etc., etc." In regard to the weight given for the Roberts boiler, I will say in explanation, that I based the same on the known weight of one of his boilers bought by us for the steam yacht Bonita, which had, by actual measurement, a heating surface of 920 square feet. This prompted me to give the boiler in the Say When, which was of 1,400 square feet heating surface, a weight, after including the water, of fourteen tons. However, I will stand corrected by Mr. Roberts' statement of the actual weight and congratulate him on his success in reducing the same almost 50 per cent.

Not being financially interested in the manufacture of any kind of boiler, I can frankly assure Mr. Roberts that the boilers of his type which we have used in our small and large yachts, have invariably given perfect satisfaction, and I would never have thought of leaving him had not results with the Taylor boiler in the 60-foot steam launch Dream, which I had designed for that boat, been so favorable that I decided to try boilers of the same type in two large yachts then building, namely, the Azalea and the Cynthia. Mr. Connors and the Union Dry Dock Co., in designing the Enquirer, intended at first to follow the dimensions of this last named yacht, but wisely increased the length 15 feet, and while they had ordered duplicates of engines and boiler, subsequently arranged for an increase of size and power in both cases. The Taylor boiler was by no means a success the first season, as it was choked in draft and soon became clogged. Its construction was then as illustrated in the Review on August 18, but as it was easy to discover the cause of this defect, Mr. Taylor rebuilt the one in the Azalea last winter, and took good care to avoid the same mistakes in the one for the Enquirer. The present boiler is made like the one in the launch, with two horizontal divisions instead of three, as shown in cut, and it is surely a great success both as to easy steaming and economy.

Having been sponsor for the first application of this boiler in large boats, I feel naturally a great satisfaction in being able to prove that my judgment was right. It furnishes what most pipe boilers do not, perfectly dry steam, which is easily explained and understood by its construction and design, and proven by actual experience and comparison. In boilers of the type of the Roberts, Almy, Herreshoff and others, where a single horizontal pipe passes over a hot fire and by numerous turns into the dome, the steam which is generated has to carry the water along at a tremendous speed, and squirt a mixture of steam and water into the dome, where it is not always successfully separated; or when the boiler is forced, the evaporation is so rapid that the water is forced back and the circulation stopped, with the result that the pipes over the fire burn and burst. That this is no theory but a fact known to everybody acquainted with these types of pipe boilers, can easily be proven by inspection. It came to my notice most forcibly only a few weeks ago, when the yacht Sentinel was here, and her engineer showed me the condition of the pipes over the grates and the openings left by removed sections which were rebuilt here. In the Taylor boiler, the steam which forms over the fire is not impeded in its natural vertical discharge. It separates in the top section and has only a few feet to travel before reaching the dome, while circulation sufficient only for the demands of evaporation is required through the feeding pipes, and at the same time, in case of unequal firing, circulation is possible in each individual section. This circulation will also appear where evaporation is forced, but at all times there is plenty of opening for the steam to escape without carrying, unnecessarily, columns of water through the dome. A peculiarity of this boiler which was not anticipated is found in its behavior when checked, which means when engines are slowed or stopped. The steam does not rise rapidly in pressure, but while steaming, increases as steam is used. The statement may appear paradoxical, but this has been actually observed on the boilers now in use.

I agree with Mr. Fairburn that heating surface alone does not always indicate efficiency, but I can not see with him how he could arrange the same more efficiently than is done by Mr. Taylor. In correcting Mr. Fairburn's figure as to the actual weight of this boiler per indicated horse power, we find the same to be less than 30 pounds. The comparison he makes between the Enquirer and Orienta really looks as if the Almy boiler was doing excellent work, but I claim the privilege to doubt the correctness of his figures and prove them to be wrong. Allowing a mean effective pressure with an initial of 250 pounds to be 38.5 pounds if reduced to the low pressure cylinder, and 36 pounds with 215 pounds boiler pressure, we find then for the Orienta: I. H. P. $= \frac{706.86 \times 184 \times 3 \times 36}{33{,}000} = 425$, while the Enquirer's engine figures: I. H. P. $= \frac{572.55 \times 356 \times 2.66 \times 38.5}{33{,}000} = 634$, which is her actual work. The speed given for the Orienta I can not dispute, but accept as being as near correct as the horse power. His comparison revised will be thus:

	Enquirer.	Orienta.
Engine	10 1-4 x 17 x 27 / 16	12 1-2 x 18 x 30 / 18
Revolutions	356	184
Steam	250	215
M. E. P.	38.5	36
I. H. P.	634	425
Boiler	Taylor.	Almy.
Grate surface, sq. ft.	51	47.7
Heating surface, sq. ft.	2,280	1,658
Weight, pounds	19,100	20,520
" per I. H. P., lbs.	30	48.3
" " sq. ft. H. S., lbs.	8.4	12.4

Mr. Fairburn's figures on the displacement performance of the two boats are based also on wrong data, which refers in particular to the assumed draft. As stated before, the Enquirer is similar in construction and machinery to the Cynthia, which I designed, and which has a displacement of only 88 tons (at 2,000 pounds), and allowing for the extra length and heavier outfit, there is no possibility of increasing her displacement to 162 gross tons. I should consider the following to be about right:

$$\text{Say When—D} = \frac{116 \times 13 \times 4.75 \times 0.37}{35.9} = 73.81 \text{ tons gross;}$$

$$\text{Enquirer—D} = \frac{126 \times 16.5 \times 5 \times 0.37}{35.9} = 107.1 \text{ tons gross.}$$

Draft of boats as given was measured under skags, while the mean draft on hulls is considerable less, but as neither deadrise nor area of midship sections are known to us, we are only speculating, as the block co-efficient above applied has no value for comparison of shape and displacement.

It would be a benefit to the fraternity if indicator cards of some of these engines were published, giving at the same time additional data about revolutions, boiler pressure and actual heating surface of boiler. This heating surface should not include anything but actual generating pipes, and not superheating or feed coils. Without full knowledge of actual facts and data, wrong conclusions are too easily drawn, as we find in looking over reports published from time to time. If the engineers of modern yachts will feel interested enough to take such cards and campare notes, I feel confident that the Marine Review will offer its columns for the comparisons and for the free and impartial interchange of ideas.

Fred A. Ballin.

Detroit, Mich., Sept. 30, 1896.

The button craze has appealed to the Penberthy Injector Co., and they do not propose to have their engineer friends going about undecorated. In an advertisement in this issue they offer to send a button and a sample copy of the "Penberthy Buletin" free to every engineer sending his address and mentioning where he saw the advertisement.

Hunters' excursion rates are offered by the Nickel Plate road to points in Michigan, Wisconsin and the southwest. 339 Nov. 1.

LIEUT. G. H. STAFFORD, U. S. N., IN CHARGE OF BRANCH HYDROGRAPHIC OFFICE, CLEVELAND.

Telegraph Service at Detour.

The Western Union Telegraph Co. has issued the following notice to vessel men: "We have established a telegraph office at Detour, located in the Huron House, with a telephone connection to Pickands, Mather & Co.'s dock. Rates from Detour to all points are the same as from the Sault. An operator is on duty day and night. Should you desire to send a message from Detour, but do not wish to stop there, four long blasts of your whistle will bring our representative out in a skiff after it. Our signal to passing boats for whom we have telegrams or orders will be a white flag in the day time and a white lantern light at night. Should you desire to communicate with owners when upbound, telegraph from Detour and receive your answer at the Sault and vice versa when bound down. In connection with the above, under the supervision of Homer J. Carr, room 726, Western Union building, Chicago, the Lake Marine News Association has established a vessel reporting and news gathering agency, fully equipped to attend to all business entrusted to them. Masters are especially requested to report at Detour news of any accident. Telegrams or letters addressed to Lake Marine News, Detour, requesitng information of any kind, will be carefully and promptly attended to."

Some Judgment Needed with the Towing Machines.

The towing machines manufactured by the American Ship Windlass Co., and which are now used on all big tows on the lakes, have had a great deal of free advertising, but it would seem that they are deserving of it. Even the few accidents to tows using this machine are serving to indicate the strength and merit of the apparatus. Both managers and masters of the Rockefeller steamer Bessemer and her consort Nasmyth, between which vessels a steel tow line was parted a few days ago, say that the accident was not due in any respect to fault in the towing machine. The parting of a tow line under the old system of towing would have created no comment at all, but as all of the big new tows of the Bessemer company are equipped with the towing machines the mishap was taken up and discussed immediately. The result is additional prestige for the machine. The Providence manufacturers say in a letter to the Review:

"We have had no end of letters regarding the parting of a line between the Bessemer and her consort. In the first place, they were not using, as we are informed, the steam cylinders at all in handling the hawser on the trip on which the accident occurred. The weather had been pleasant and they therefore shut off the steam and were towing with the friction band arrangement. They evidently put the friction band down too solid, so that it would not give at all, and that parted the hawser. It is interesting to note in this connection that another party has written us, saying that the friction band arrangement was not powerful enough, but it seems that when set down solid and without common sense it was stronger than the wire hawser. Ordinary judgment must, of course, be used with this apparatus, as with all other machinery, and the parting of this hawser was no test of the machine, as they were not using it in the regular manner by compressing the steam in the cylinders and getting the elasticity of the compression. The Philadelphia & Reading Railroad Co. ordered one of these machines for the steam collier Lebanon in the early spring of 1895. It worked so well and so correctly as an automatic machine that they then put one on their tug International. Results on the Interntional were the same as on the Lebanon. Later on this company ordered a new tug built, called the Tamaqua, and on this vessel they placed a complete outfit, including Providence steam iron towing bitt windlass, steam towing machine, and capstan aft. They are now building another tug, and have called for an outfit that is to be a duplicate of that on the Tamaqua. They will thus have four steam towing machines when this tug is completed. It is the same with everybody who has used this machine. When used as it should be used it is perfect in its automatic action. People are very much pleased with it, and the fact that one party claims that the friction band is too powerful and another party claims that it is not powerful enough, shows that the band is about right when used in a common-sense manner, because they have the power to part the hawser by the friction band, and therefore it is not necessary to put on all the power and compress the friction band so tightly as to prevent its giving at all when required."

In General.

At the launch of a torpedo boat destroyer in the ship yard of the Palmers company, Jarrow, England, recently, it was announced that the same ceremony had been carried out in the yards of the company no less than 711 times.

Although the stranding of the wooden schooner Yukon of the Wilson line was within the Cleveland harbor, and her release was simply a matter of lightering about 500 tons of ore, the loss will foot up about $3,000.

Hon. James F. Joy, who built the first Sault canal and who was later president of the Michigan Central Railroad, as well as a leader in other big enterprises in Detroit and Michigan, died at his home in Detroit, Sept. 24. He was eighty-five years of age.

It is reported from Montreal that Frank E. Kirby of Detroit is preparing designs for two steel side-wheel steamers for the Richelieu & Ontario Navigation Co. The vessels are to be at least 275 feet in length and if built will ply between Toronto and Prescott, Ont.

A steel four-bladed propeller, cast at Chester, Pa., recently, for the John Englis, a steamer building at Roach's yard, weighs 15,000 pounds or 7½ tons. The wheel is 16 feet in diameter. Its hub is 26 inches in diameter and the thickness of the blades at the hub is 6 inches.

The navy department has decided to convert one of the 1,000-ton composite gunboats now building into a practice ship for naval cadets, to take the place of the Bancroft, which has gone to the Mediterranean, and will continue to be used for cruising purposes, probably finding her way to Chinese waters for service in the small rivers of the Orient.

John Jacob Astor's electric yacht recently launched at Nyack, N. Y., is the largest vessel of its kind in this country. It was built from designs by C.. D. Mosher, and is 72 feet long, 12 feet beam, and 4 feet draught. It has two electric motors, said to be of 25 horse power each, and is expected to make 16 miles an hour. The screws and centerboards, of which there are two, are of Tobin bronze.

Of the three 30-knot torpedo boats, for which the navy department opened bids a few days ago, two will be built by the Bath Iron Works of Bath, Me., and one by the Union Iron Works of San Francisco. Wolff & Zwicker of Portland, Ore., are successful bidders for two 22 knot boats, and of the 20-knot boats the Herreshoffs will build three, Columbian Iron Works of Baltimore, two, and Hillman Bros. of Philadelphia, one.

At Nyack, N. Y., Charles D. Mosher has about completed a high-speed mahogany steam yacht for Mr. E. B. Warren of Philadelphia. She is 83 feet long, 8½ feet beam, and 3 feet 6 inches draught. She will be a single-screw boat, and will have a guaranteed speed of 30 miles an hour. Engines are to be of quadruple expansion type, and of about 800 horse power. They will drive a propeller of manganese bronze 3½ feet in diameter. Five steel bulkheads divide the hull into six water tight compartments.

MARINE REVIEW

DEVOTED TO LAKE MARINE AND KINDRED INTERESTS.

Published every Thursday at No. 409 Perry-Payne building, Cleveland, Ohio, by John M. Mulrooney and F. M. Barton.

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The books of the United States treasury department on June 30, 1895, contained the names of the 3,342 vessels, of 1,241,459.14 gross tons register in the lake trade. The number of steam vessels of 1,000 gross tons, and over that amount, on the lakes on June 30, 1895, was 360 and their aggregate gross tonnage 643,260.40; the number of vessels of this class owned in all other parts of the country on the same date was 309 and their tonnage 652,598,72, so that half of the best steamships in all the United States are owned on the lakes. The classification of the entire lake fleet on June 30, 1895, was as follows:

	Number.	Gross Tonnage.
Steam vessels	1,755	857,735.13
Sailing vessels	1,100	300,642.10
Unrigged	487	83,081.91
Total	3,342	1,241,459.14

The gross registered tonnage of the vessels built on the lakes during the past five years, according to the reports of the United States commissioner of navigation, is as follows:

Year ending June 30, 1891	204	111,856.45
" " " 1892	169	45,968.98
" " " 1893	175	99,271.24
" " " 1894	106	41,984.61
" " " 1895	93	36,352.70
Total	347	335,433,98

ST. MARY'S FALLS AND SUEZ CANAL TRAFFIC. (*From Official Reports of Canal Officers.*)

	St. Mary's Falls Canal.			Suez Canal.		
	1895*	1894	1893	1895	1894	1893
No. vessel passages	17,956	14,491	11,008	3,434	3,352	3,341
Tonnage, net registered	16,806,781	13,110,366	9,849,754	8,448,383	8,039,175	7,659,068
Days of navigation	231	234	219	365	365	365

*1895 figures include traffic of Canadian canal at Sault Ste. Marie, which was about ¼ per cent. of the whole, but largely in American vessels.

Referring to the fining of vessels for running at a speed greater than that provided by law for the navigation of St. Mary's river, Mr. H. E. Schmuck of Springfield, Mass., said in a communication recently to the Review: "I do not think Capt. Davis or his men have any way under the present arrangements of determining, with any degere of accuracy, the speed of a vessel—whether it is 5, 7, or 10 miles an hour—only by their own judgment." Mr. Watson, editor of the Engineer of New York, takes up this paragraph and proceeds to tell us that "it is quite possible to ascertain the speed of a vessel at any time within very small margin either way by the speed of the screw." But Mr. Watson evidently failed to understand that the Capt. Davis referred to is the captain of one of the United States revenue cutters and that he passes judgment not upon the speed of his own vessel, but that of others, which are sometimes far removed from his revenue cutter; and his judgment as to speed will very probably be upheld in most cases, no matter what the other fellow may have to say about the revolutions of his propeller. But the New York editor's note about determining speed from the screw is, nevertheless, interesting. He says: "Suppose the engine makes 40 revolutions per minute, and the pitch of the screw is 20 feet. In 60 minutes there would be 2,400 revolutions, which, multiplied by twenty, equals 48,000 feet per hour run by the screw. This divided by 5,280, the number of feet in a mile, gives 9 2-5ths miles per hour. It is very easy to regulate the speed of a vessel by the turns of the screw, so as to make whatever speed may be called for. We have made no allowance in the above rule for loss by slip; 10 per cent. should be deducted for it."

It is probable that, on account of the great number of big river and harbor and coast defense works that are now demanding the attention of army engineers, no engineer officer will be selected to succeed Col. Wm. Ludlow, who was until recently attached to the United States legation at London. There has been no increase in the engineer corps since 1863. The work of the corps has steadily increased, and at present the engineers have more work before them than ever before. In addition to the vast amount of river and harbor work authorized by the last congress, contracts for coast defenses, involving an expenditure of $5,000,000 or $6,000,000, will soon be awarded. "These contracts include," says the Army and Navy Journal, "a large number of gun forgings, the manufacture of rifles and the purchase of material with which to begin the preparation of the various sites for seacoast batteries. Land for emplacements in the majority of the cases has been obtained, and where it has not, condemnation proceedings are being taken to secure it. The plans for the defense of the more important cities has been decided upon. The plans will not be made public, and the cities the fortifications are intended to protect will not know the actual number of guns to be mounted or the character of the works until they are nearly completed. Congress has allowed $12,000,000 for the protection of the larger and more important cities from sea attack. The 16-inch rifle, now under construction, is intended solely for such fortifications."

The order in council from the new Canadian government opening the canals on Sunday may be welcomed in some quarters, but it is certain that as a whole the shipping community on this side of the lakes is not in favor of an increase in Sunday work. Shippers and vessel owners in the iron ore and coal business especially have had enough of Sunday work and would gladly welcome a strong movement towards abolishing it entirely, if a leader could be found to undertake the task. Every dock manager on Lake Erie will admit that he has never profited by labor on Sunday. Losses can always be traced to temporary gains made in loading or unloading vessels on Sunday.

An idea of the extent of the free light-house service in the United States may be gained from the statement that at the time of the board's last annual report the number of aids to navigation maintained in all parts of the country was 8,307. Of these 2,859 were lighted aids and 5,448 unlighted aids. The light vessels numbered forty and the fog signals 311.

The British admiralty goes right along with the adoption of water tube boilers for war vessels. Thornycroft and Babcock & Wilcox boilers have recently been ordered for four torpedo gunboats at a total cost of about $500,000. Two cruisers are also to be fitted immediately with boilers of this kind at a cost of about $140,000 each.

Although the displacement of the French torpedo boat Forban, built by the famous Normand of Havre, is only 150 tons, her engines have developed 3,250 horse power. It is not surprising, therefore, that she covered a distance of about 35 statute miles in an hour.

Strange Accident to a Ship in Dry Dock.

The strange accident to the wooden side-wheel passenger steamer Muskegon of the Goodrich line at the dock of the Milwaukee Ship Yard Co. has caused quite a discussion among vessel men. A ship builder who has seen the vessel in dock says she is a most complete wreck. "It seems," he says, "that the Milwaukee company docks vessels regularly without the use of horizontal side shores, which is a safe enough practice when the vessels are of full form with a long midship body, and when they have bilge blocks all ready to take and support the bilges. With a side-wheeler like the Muskegon, which has a short midship body and very fine ends, the procedure in docking should be different. It is best in vessels of this form to use side horizontal shores from about the fender strake to the side of the dock, to keep the vessel perfectly upright on the keel blocks, until the dock is pumped out and the bilge blocks are placed under the bilges. In fact, many builders keep the shores in place on side-wheelers until they are floated from the dock. It is claimed that the Milwaukee people did not place any side shores on the Muskegon, and the few bilge blocks amidships not fitting well, she lay over to starboard and plunged forward a bit, tripping most of the keel blocks, and those she failed to trip went through her or forced her bottom in. She is broken in three or four places on the keel forward and in one place aft. Both arches are broken clean through, and arch posts split to pieces. Her planking as far aft as the paddle wheels is torn apart. The cabin forward is broken to pieces and twisted out of shape, right fore and aft. She went into dock for the purpose of tightening a few holding-down bolts on the engine bed and was in good shape when she went in. She would have remained in service for some time yet this season if the accident had not occurred."

It will be quite a job to get the wrecked steamer out of dock. The Muskegon was built in 1871. She was of the old type of side-wheel steamers, with high arches and a wide overhang. Her insurance value was $25,000.

Reduced rate tickets are offered for sale by the Nickel Plate road to points in Michigan, Wisconsin and the southwest for the benefit of hunting parties. 337 Nov. 1.

The Trouble with Belleville Boilers.

The trouble encountered again during the past season with the Belleville water tube boilers in the Northern line passenger steamers North Land and North West, especially the latter boat, has been the subject of a great deal of comment among engineers on the lakes, and rumors have been circulated about new boilers being adopted. Builders of the steamers have disclaimed any responsibility for difficulty with the boilers, as they hold that they opposed the adoption of them at the outset. Mr. Miers Coryell, who represented the French owners of patent rights on the boilers, and who, even up to the close of the passenger season this year, has been trying to straighten out the trouble, claims that the unsatisfactory operation of the ships has been due entirely to negligence in the management of the fire rooms. He writes the Review from New York at considerable length on the subject, and in order to understand his explanation of the trouble, it will be necessary to print first a copy of fire room instructions, which he issued last spring in Duluth, before the steamers were brought out for the season. These instructions are as follows:

1. The boilers are filled by opening the blow-off cocks on mud drums; the air cocks on top of steam drums and the steam jet valves.

2. The water in the gauge glasses must show 2 inches only, when lighting fires. The heat soon raises the water in the glass.

3. As soon as steam shows, shut the air cocks and the steam jet valves.

4. As soon as the pipe from the drum, which leads into the feed collector at bottom of elements, becomes too hot for the hand, blow off slightly a few times to avoid the hammering. This equalizes the heat in the boiler.

5. When the pressure reaches 60 or 70 pounds, open the stop-valves slightly to warm up the steam pipes and equalize the pressure in all the boilers in use.

6. The graduating feed cocks near the fire-room floor are now to be opened and the feed engines started slowly.

7. When the main engines are started the water rises rapidly in the glass and may disappear altogether; if so, make sure that the regulating feed valves on the automatic feeders close properly and work freely.

8. After the fires are lighted charge the furnaces moderately and only one-half at a time; allow a few minutes to pass before charging the other half. Four or five small shovel fulls at a time are enough for each charge, and the intervals between the charges are to be longer or shorter according to the required speed of engines.

9. The proper manner of firing is to charge one-half only of every alternate furnace. Beginning at one end of the group, the fireman passes to the other end, and then returns charging the remaining half of every alternate furance. This assists in regular steaming, because one half of each furnace is in full heat to consume the gases from the freshly charged coals upon the other half. Coal so charged creates but little smoke, gives out greater heat and never burns above the tubes to destroy the smoke stacks.

10. Keep the fires 3 to 4 inches thick, evenly covering the grates at all times. Make the charges quickly to keep the furnace doors open the least possible time.

11. To stop steaming, open the tube-box doors to the notch; shut the ash-pit doors, but keep the furnace doors closed to preserve the tubes from damage.

12. Be sure to set the graduating feed cock on each boiler, to be just enough open to keep the water at half glass or a little higher. This is important and assists the work of the automatic feeder.

13. The steam stems of automatic feeders must be well greased and kept in condition of easy working. When the water is at half glass the outside lever is level and the regulating valve is closed to prevent water going into the boiler; it should open when the water falls an inch in the glass. Move the outside lever up and down by the aid of the hook every hour to insure its working.

14. Keep the ash pan full of water to preserve the grates.

15. Clean the soot and ashes off the tubes and scrape the lower halves of the two lower rows of tubes at frequent intervals, say every two hours.

16. Never suddenly open or close any cock or valve on these boilers, as that might cause leakage by creating a blow or jar that is avoided by more easy handling.

17. When stopping for a few hours or longer, fill the boilers not in use with water, so as to overflow at the air-cocks. When relighting fires draw down the water to show two inches in the glass. This cleanses the steam drum and pipes of grease and mud.

In a letter submitting these instructions, Mr. Coryell says: "Disregard for paragraphs 2, 3, 4, 5, and 6 of these instructions, that is the sudden mixing of high temperature steam with the colder water in the boilers, ruptured the newly made elements before pressure reached them. This occurred on the North West, and her lay-up at Cleveland for a better supply of elements was so much time wasted, as the same thing was repeated at the Encampment in the Sault river at a time when she was delayed five or six hours by some sort of an obstruction to navigation. The alleged cause was bad work on the new elements, 'because there was only half pressure on at the time.' Neglect for paragraphs 8, 9, and 10 is the cause for waste of coal, overheated smoke stacks and heavy smoke discharge. Paragraph 11 was steadily ignored, and as a result the tubes were subjected to severe strains. The same is true of paragraphs 12, 13 and 14, and paragraph 15 was not applied to the boilers with any regularity. Soot was allowed to become fairly baked on the tubes, and then chisel bars and curses did the cleaning, instead of using steam brushes for a period of five minutes at intervals of every two hours. Paragraph 16 was too much for an ordinary fireman to absorb, when his shovel was so near at hand, and 17 was in direct conflict with everything they had ever heard of. As a result, the boilers were often over full of water. But the engineer said it made no difference, as no water went over into the boilers, and their ways (the firemen's ways) were different from instructions. I want to say that at the beginning of the voyages these printed instructions were demonstrated to be useful and needful, and with the extra fire-room force that was allowed were to be enforced. If they had been enforced a limited number of boilers would supply the necessary steam. Little if any smoke need be seen coming out of the stacks and the combustion of gases in the stacks would never occur with thin fires as directed and the tubes clear of soot.

"Among some of the practices which prevailed, and which the engineers claimed they could not prevent, were the following: Heavy fires, brought on by charging the furnaces with lumps of coal that were limited in size only by the dimensions of furnace doors; ash pans full of dirt and clinker; furnace doors wide open half the time; damper doors kept wide open; boilers too full at times and again allowed to run scant of water, thereby damaging them; fire room force cleaning a number of furnaces at a time, and in fact, conducting work of this kind at their leisure, allowing the steam pressure to drop as much as 100 pounds; then further delay by fires too thick to allow a passage of air through them, and a consequent discharge of clouds of black smoke instead of kindling fires in the furnaces. Then, too, the discharge pumps for disposal of ashes were run without a mixture of water with the cinder, which was equivalent to rotating them in emery. It would seem that they were purposely rendered useless, in a spirit of destruction and wickedness. As a result of this, the boats would reach port with fire rooms 18 inches deep with ashes. The only answer made by engineers to remonstrances against bad management of this kind was: 'They will do it (meaning the firemen) and we can't help ourselves.' I call this incompetency. I would like to give it a more uncomplimentary term. No engineer should submit to anything of this kind, and as I have informed myself by personal investigation, there are competent engineers on the lakes, and plenty of firemen, too, who are willing to do work as they are told to do it.,"

Stocks of Grain at Lake Ports.

The following table, prepared from reports of the Chicago board of trade, shows the stocks of wheat and corn in store in regular elevators at the principal points of accumulation on the lakes, Sept. 26,1896:

	Wheat, bushels.	Corn, bushels.
Chicago	13,549,000	4,855,000
Duluth	4,940,000	11,000
Milwaukee	409,000	3,000
Detroit	414,000	9,000
Toledo	656,000	50,000
Buffalo	2,324,000	310,000
Total	22,292,000	5,238,000

As compared with a week ago, the above figures show at the several points named a decrease of 695,000 bushels of wheat, and an increase of 143,000 bushels of corn.

Enquirer—Say When Steam Yacht Race.

Editor Marine Review:—We are the manufacturers of the Taylor upright water tube boiler, but up to date we have had no part whatever in transferring the contest beween the above named boats to a contest between boilers. Not a word has till now been written on the subject at our dictation or suggestion, nor within our knowledge until it appeared in print, but now it seems to us to be in order to make a few corrections to Mr. William A. Fairburn's article in your issue of Sept. 24.

Your correspondent who first opened up this subject, assumed from such data as he had at hand that the Enquirer's Taylor boiler weighed 24,640 pounds, whereas it weighed 19,100 pounds, and could be reduced to 14,000 pounds and still have as much and as effective heating surface as the Almy boiler, as per Mr. Fairburn's showing. (The Taylor boiler weighs 8 1-3 pounds to a square foot of heating surface.) Your correspondent's erroneous weights misled Mr. Fairburn in that particular, and in consequence he gives some wrong figures in his article, hence we will pass over that part of it.

In that article Mr. Fairburn has seen fit to introduce the Almy boiler into the controversy, which is our excuse for mentioning it by name in this reply, later on. It is not our purpose to attempt to build up the reputation of the Taylor boiler by tearing down that of any other make. Mr. Fairburn asks: "How do you repair this boiler without tearing it all to pieces, and what would be the result of any part of it giving out at sea?" We have this to say in reply: "The Taylor boiler is made in sections. Any part of any section may be taken out at any time without disturbing its fellow on either side. Every pipe in every section is interchangeable with its fellow pipes in its own and every other section. A single section might be stored on board without taking up much space, and it would supply any part which might possibly give out; or a section may be plugged at the bottom manifolds and dome, and repaired when next in port. But, practically, they are not repaired. No pipe or fitting has ever yet given out in any Taylor boiler.

It seems to us pertinent to this correspondence to state the following facts: The steam yacht Sentinel, with its Almy boiler, and the Dream, with its Taylor boiler, were brought out the same season. On August 26 last we were called upon to repair the pipes over the fire of the Almy boiler in the Sentinel. We have in our possession pipes taken from that section, which from their position over the fire had been so frequently subjected to the sudden changes in temperaure of a tremendous heat below, with nothing inside save possibly superheated steam, instantly changed to the temperature of the water, causing the pipes to scale off inside at every such sudden change, that the original thickness of the pipes had been reduced to a mere shell and finally had bursted. They are quite free from sediment. These pipes over the fire really need renewal throughout. On the other hand, the Taylor boiler in the Dream has been used just as long and has never had a repair of any kind, and its crown sheet is as perfect to-day as when put in three years ago. This is "the proof of the pudding by the eating."

Mr. Fairburn further says: "I shoud not be surprised if much of the heating surface in the Taylor boiler becomes overheated by not having proper circulation." It might answer the purpose to again offer the "proof of the pudding" argument, and say that in no instance has this occurred in any Taylor boiler ever yet made, as before stated, but we will go a little further. We have shown above, and have the proofs in our possession, that this has occurred in the Sentinel's Almy boiler. We believe also that every boiler built on a similar arrangement of water tubes is liable to that trouble. It was that belief (based on experience) solely, which impelled Mr. Taylor to try to devise an arrangement of water tubes which would insure full pipes under all circumstances, and he has succeeded. It is not possible to expel the water from any part of the surface of the pipes of the Taylor boiler by firing, or to injure any pipe or fitting by burning or cracking, because the circulation is so perfect. Neither can the circulation be stoppd. This is not true of any boiler using horizontal pipes over the fire. The circulation is often broken by the steam forcing the water out and holding it there long enough to heat the pipes to a white heat; then the water suddenly returns, cools the pipe, and a scale is raised inside. This reduces the thickness of the pipe (which is always heavy) till it bursts. It always occcurs in the same place—immediately over the fire. The Taylor boiler uses the lightest steel pipe on the market and subjects each section to 600 pounds pressure before assembling the sections and 400 pounds after assembling. There can be no greater strain on any part of the Taylor boiler than on the safety valve, as there is no unequal heating.

Detroit Screw Works,
Detroit, Mich., Sept. 29, 1896. Geo. Thrall, Sec'y & Treas.

Trade Notes.

The Institute for Home Study of Engineering, owned and operated by the Scientific Machinist Co., Blackstone building, Cleveland, has just issued a handsome catalogue. The work of this school in the different branches of electricity, mechanics, mechanical drawing and steam engineering, is proving attractive to progressive mechanical men.

The Almy water tube boiler placed on the Seaconet Steamboat Co.'s steamer Queen City at Providence, R. I., in 1889, has been in use ever since and in the 6½ years has saved $2,300 worth of fuel. Parties interested in water tube boilers may have a comparative statement of performance of return tubular and Almy boilers mailed them by applying to the Almy company at Providence, R. I. This company has issued recently a new catalogue. They have also put on the market an automatic feed water regulator.

A combination horizontal boring, drilling and milling machine that would be convenient for marine engine building concenrs has just been put on the market by Bement, Miles & Co., Philadelpia. They have built larger machines of this type, but the No. 1 has capacity for drilling or boring in the center of a 66-inch circle. Screw cutting attachments are furnished when desired. The spindle has a traverse of 40 inches, and two feeds are provided for drilling and two for boring. These feeds and the spindle movement are controlled from the most convenient position. The main table is made 4 or 5 feet long, and the yoke is adjustable and can be clamped to the main table to increase stiffness. An inquiry addressed to the firm's Chicago office, No. 1534 Marquette building, will be answered with the illustrations and a full description.

The number of naphtha launches used for pleasure and passenger business has so increased during the past few years that parties who would be benefitted by it have endeavored to secure legislation that would require the employment of engineers and pilots. In the past such effots have been overcome by information showing the simplicity of such engines. But the latest bill, making boats of this class of 15 tons and over that carry passengers for hire subject to United States inspection laws, that require employment of engineer and pilot, and making all launches subject to the rules relating to lights, signals, steering, etc., will probably become a law. This leaves launches of all sizes used for pleasure untrammelled as to rules excepting those that aim at safety in navigation. Launches complete may be obtained from the Gas Engine and Power Co., Morris Heights, New York, for $500 and from that upwards to $5,000. It may not be generally known that this company will sell engines alone for hulls built elsewhere. An engine of one horse power is listed at $350, and an eight horse power engine at $1,000, the weight of the latter being only 600 pounds. As regards the safety of their launches, this company makes an offer of $500 to anybody who can explode one, and they furnish the launch for the experiment, requiring a deposit of $100 as an evidence of good faith. Much valuable information regarding pleasure boats is included in a catalogue recently issued. It will be sent on request of those interested.

Milwaukee's new fire boat, which is being built by Rieboldt, Wolter & Co., will have pumps of 6,000 gallons capacity per minute. The Charles F. Elmes Engineering works of Chicago furnishes engines, pumps, steam steerer, etc., at a total cost of about $15,000, and Rebioldt, Wolter & Co. get $11,970 for the wooden hull. Boilers are extra. The boat is nearing completion. She is 107 feet over all, 24 feet baem and 11 feet depth of hold.

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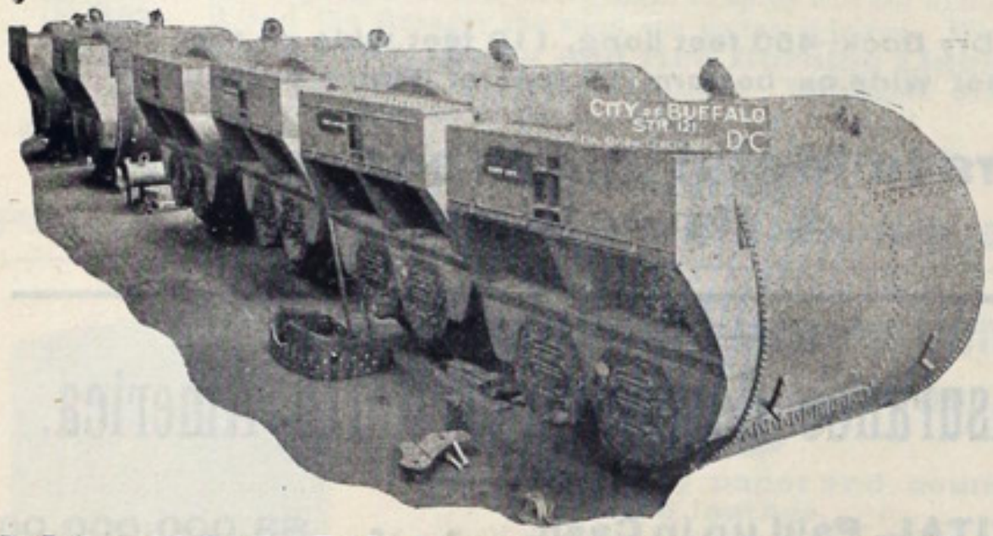

Six Boilers with Howden Hot Draft appliances now in Side-Weeel Steamer City of Buffalo. Dimensions of each boiler—12 ft. 6 in. diameter by 12 ft. length.

ECONOMY in operating expenses on Lake Ships must come from reduced coal bills. No great saving can be made in labor cost, and provisions are already low. But fuel bills can be lowered and cheap coal used to advantage by adopting Modern Methods of making steam at low cost.

No manufacturer of pig iron would to-day think of running his furnace without a hot blast. Competition would not permit it. This same competition demands advanced practice in the operation of ships. The same principle is applied in the

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We have Four Large CHUTES on our Docks at AMHERSTBURG, ONTARIO, 1,000 FEET RIVER FRONT and Day and Night Force.

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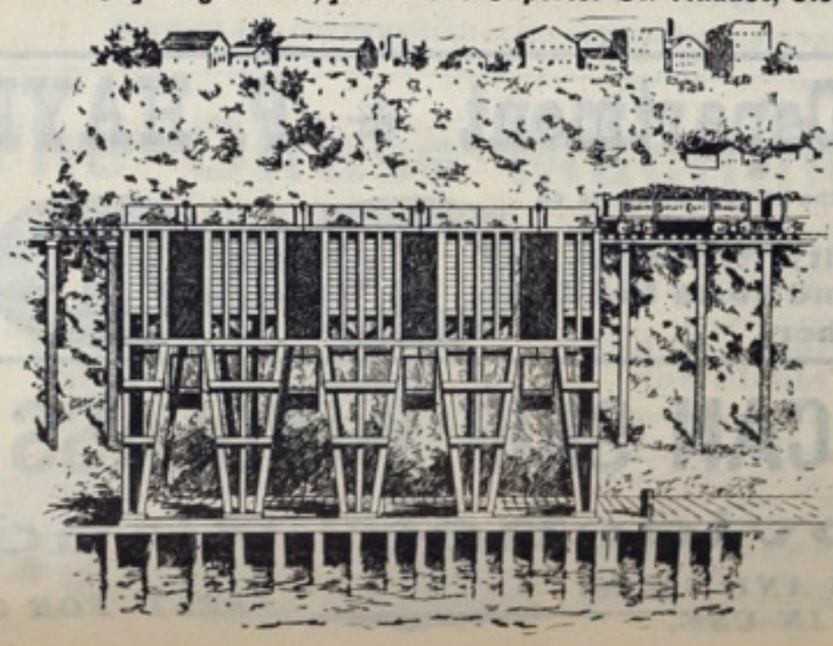

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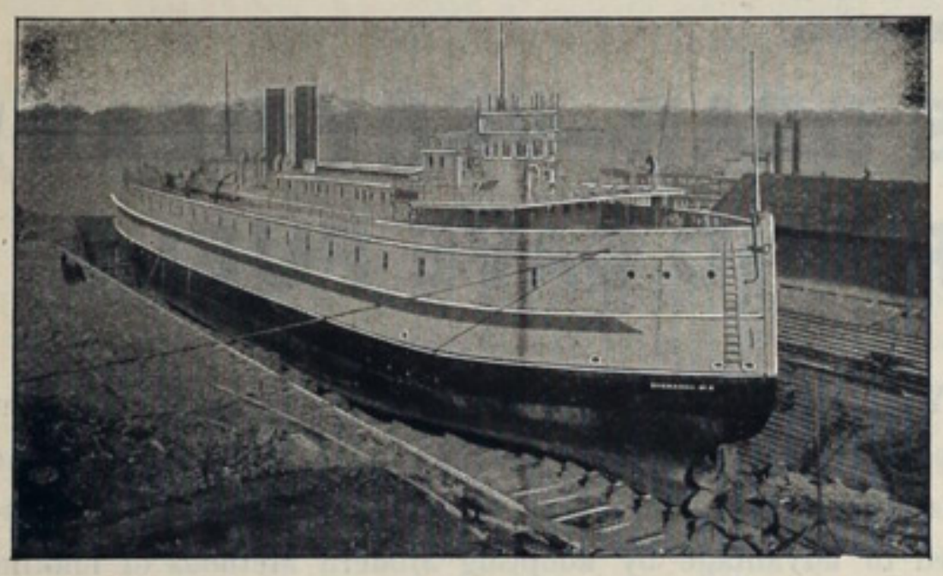

Shenango No. 2, 300 feet long, 54 feet beam.

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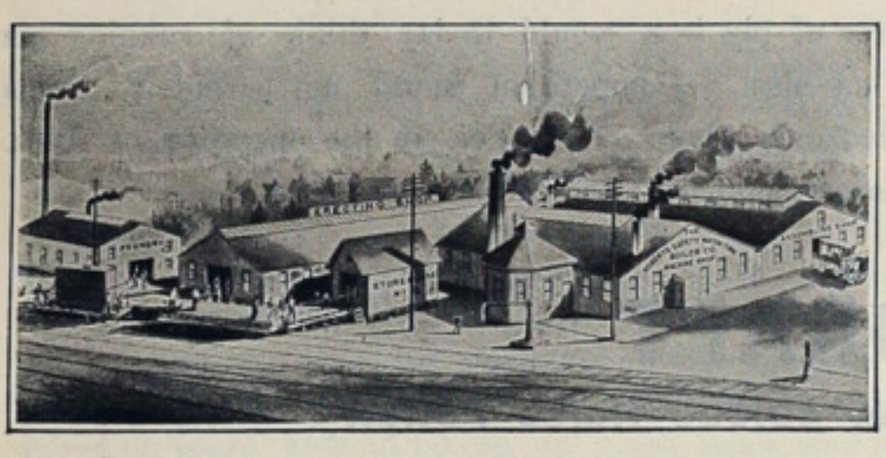

Office of AMERICAN STEEL BARGE Co.

West Superior Wis., Oct. 31, 1895.

The Roberts Safety Water-Tube Boiler Co., 39 and 41 Cortlandt St, New York

Gentlemen: Replying to yours of the 28th I am glad to say that the boiler you furnished us for tug 'ISLAY" is giving entire satisfaction. I have heard no complaint about it whatever, but have heard a good deal in its favor. I ride on the boat frequently and must say that I am much pleased with its work. Very Truly yours, Alexander McDougall, General Manager.

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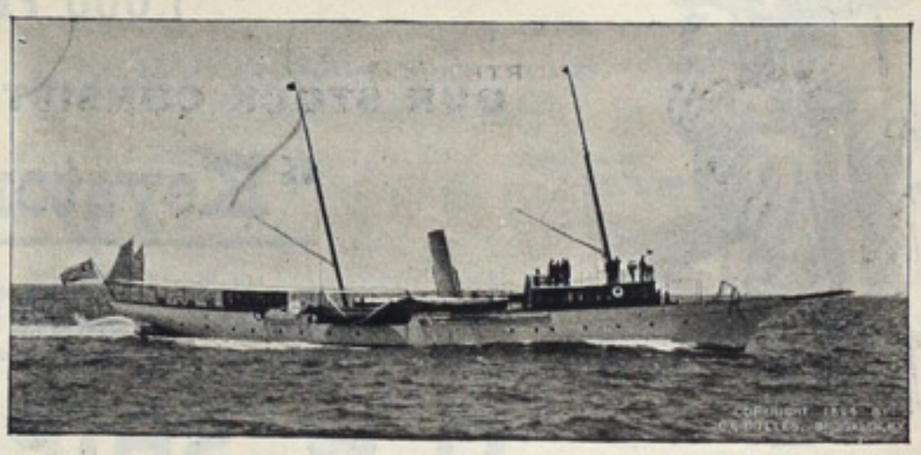

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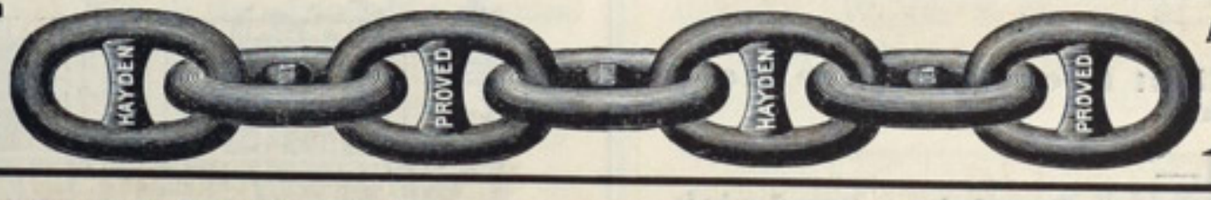

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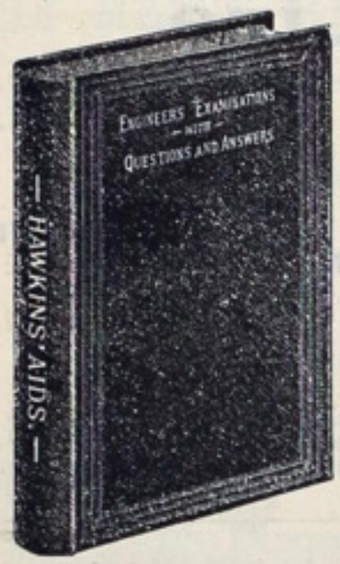

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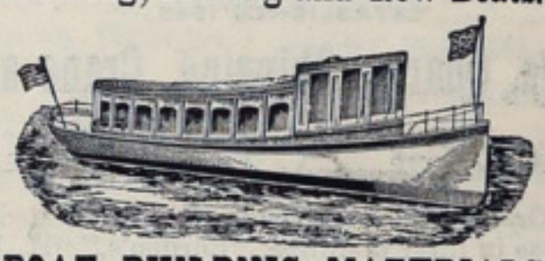

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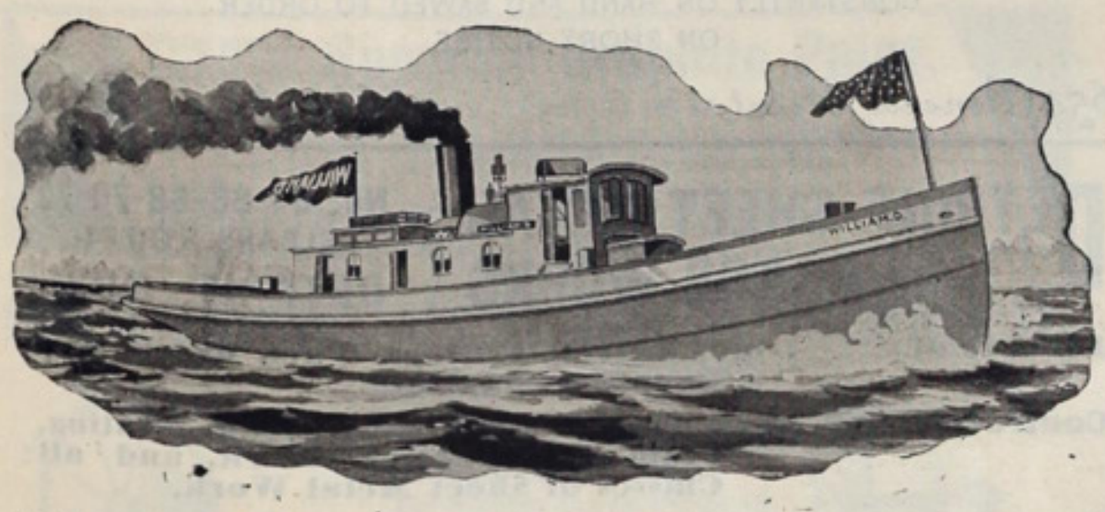

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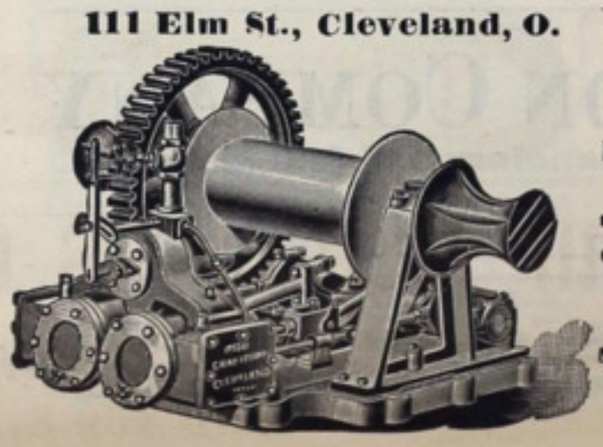

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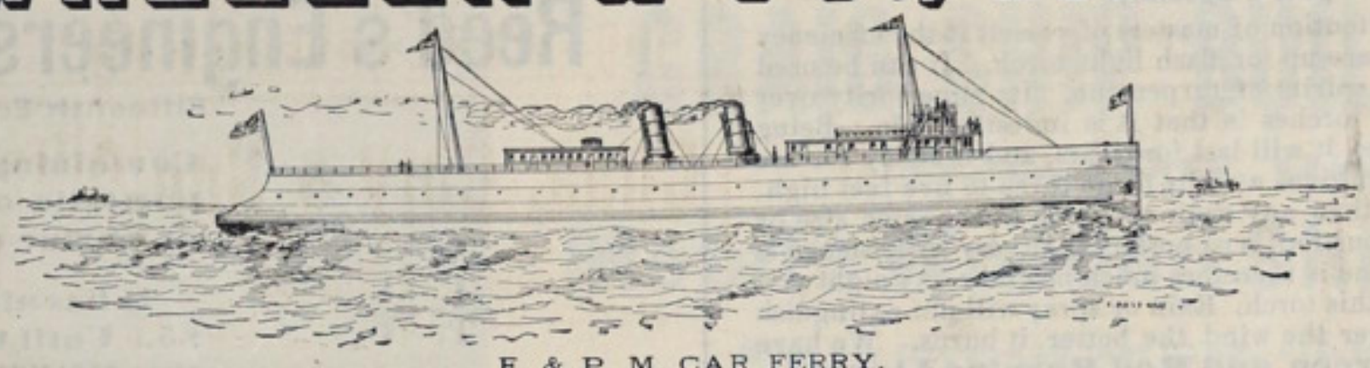

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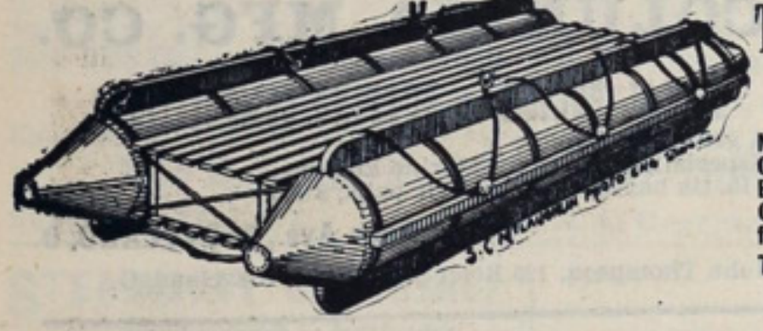

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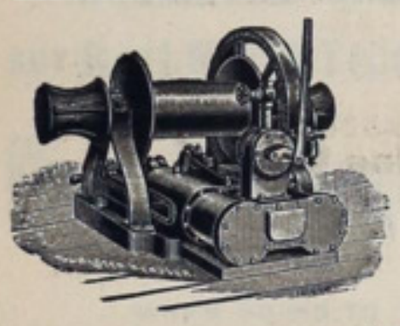

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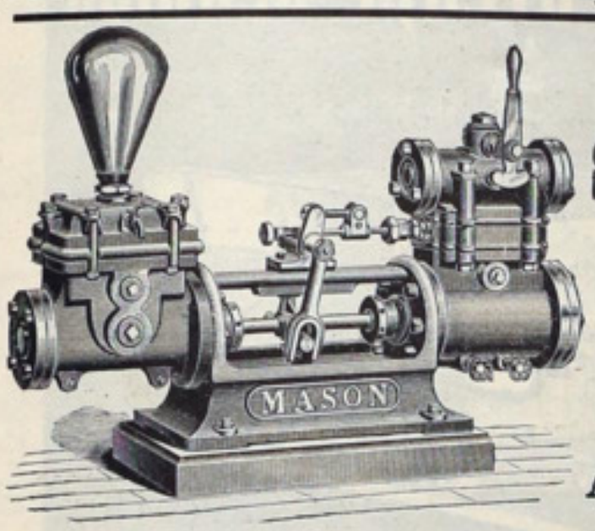

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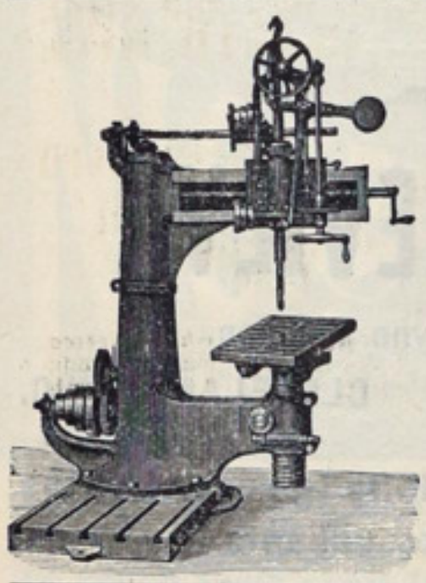

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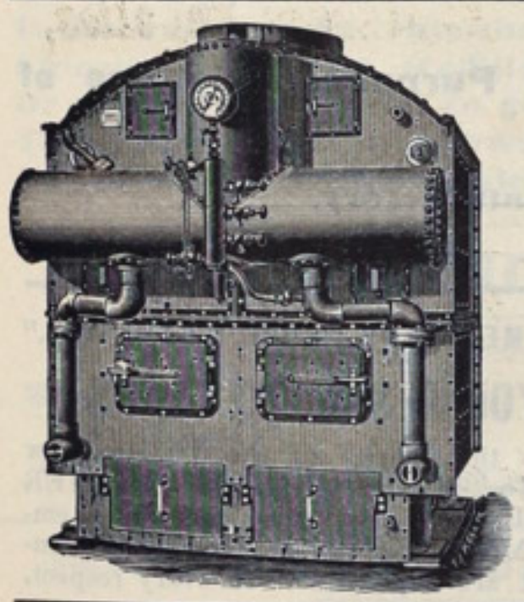

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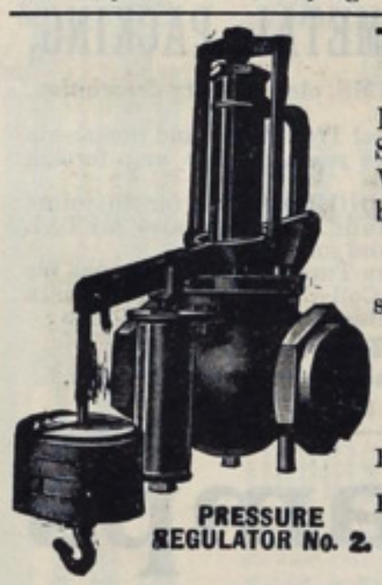

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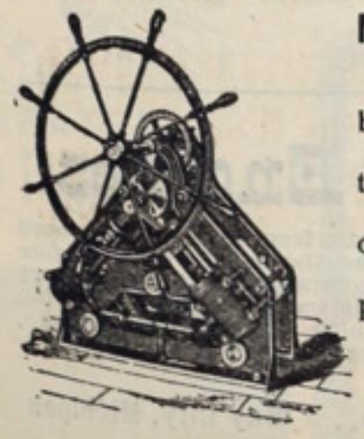

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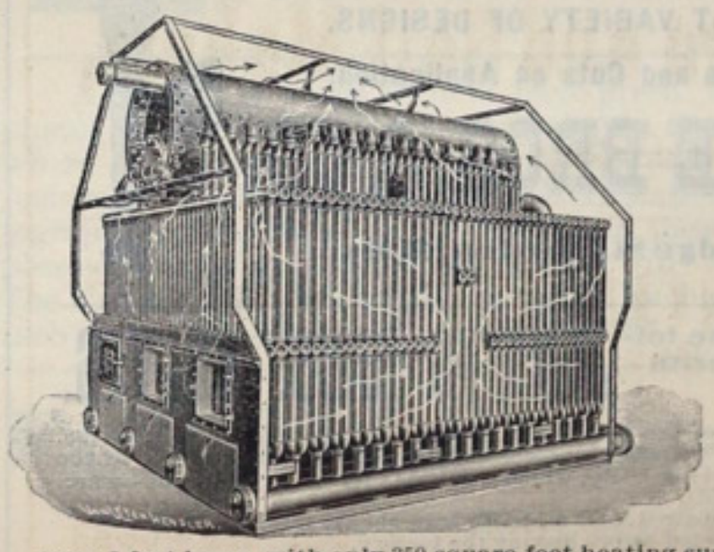

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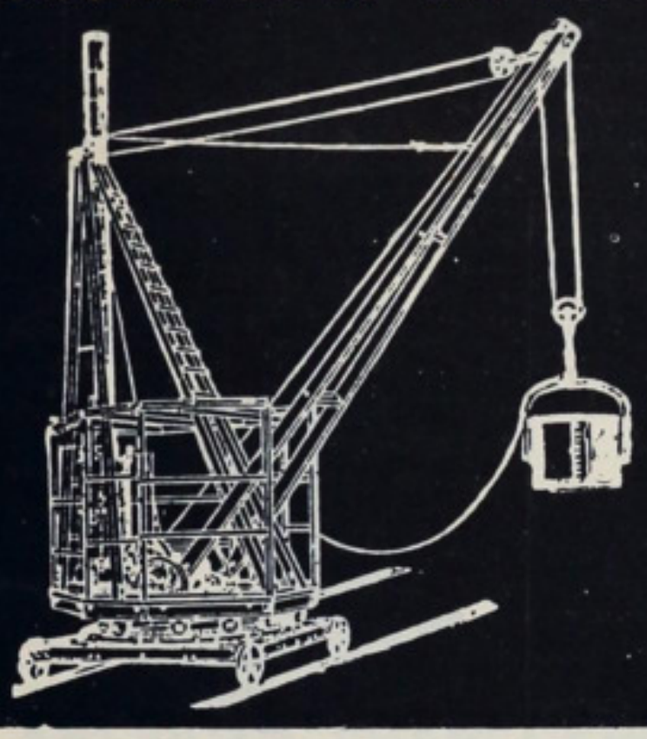

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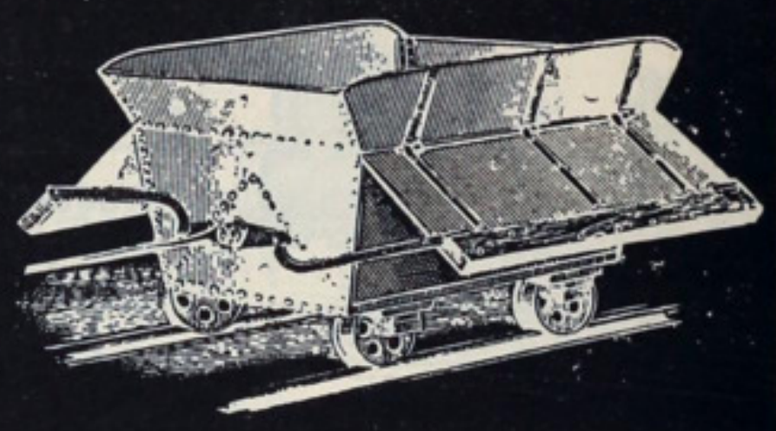

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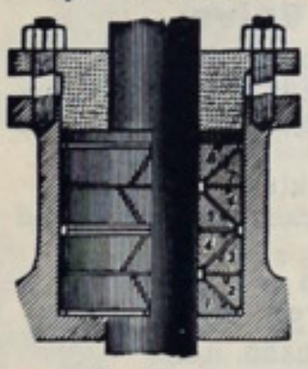

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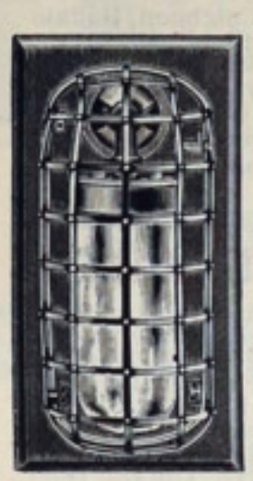

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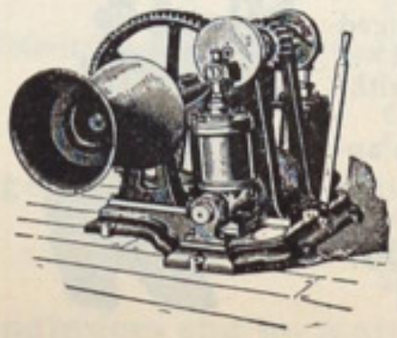

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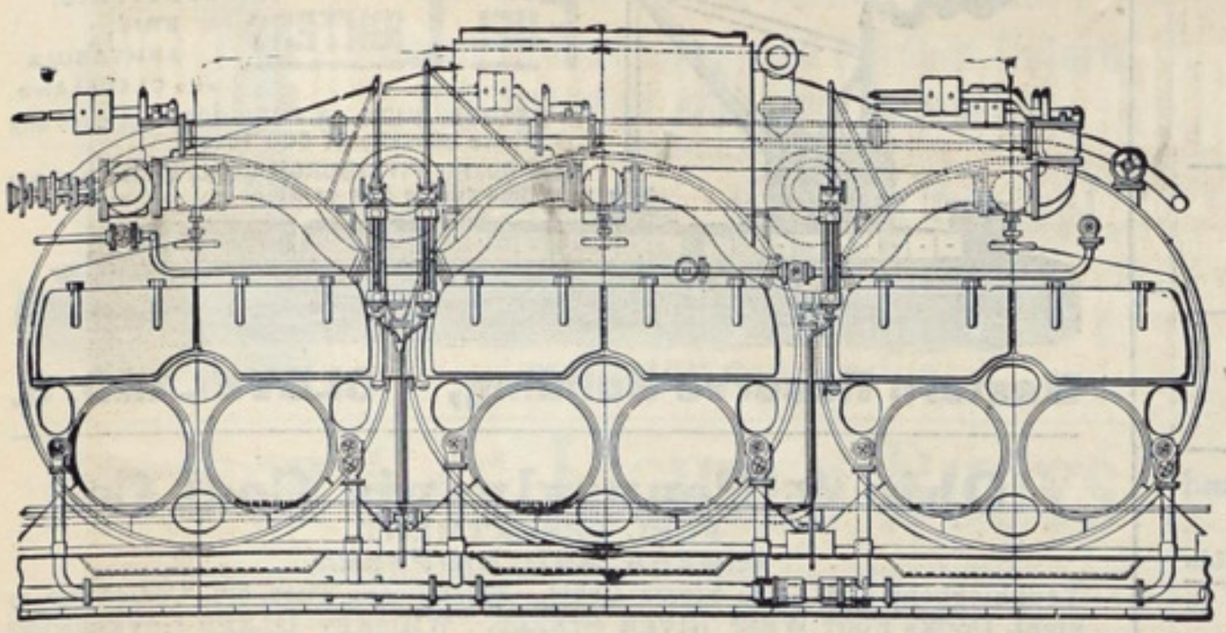

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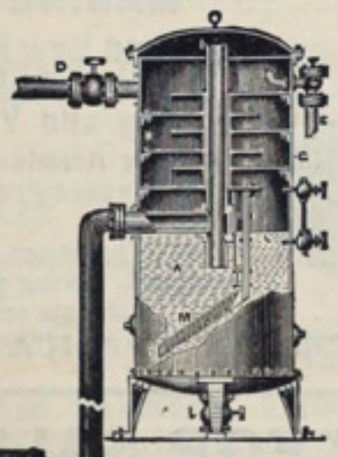

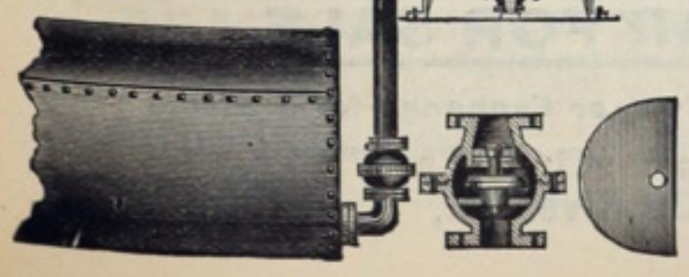

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C.—Feed pipe to boiler.
D.—Steam pipe.
E.—Water supply pipe.
F.—Check valve.
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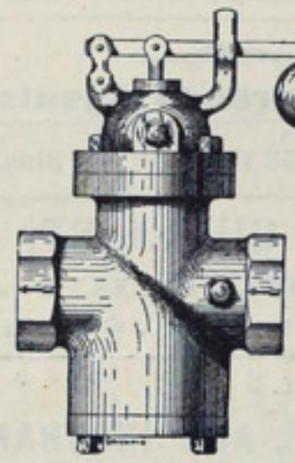

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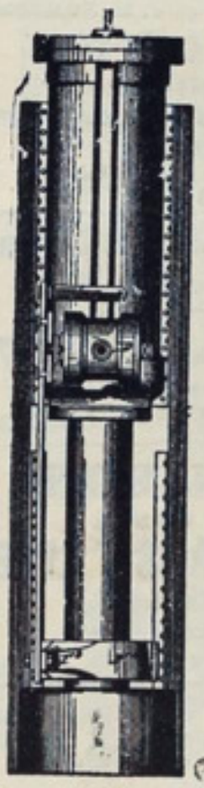

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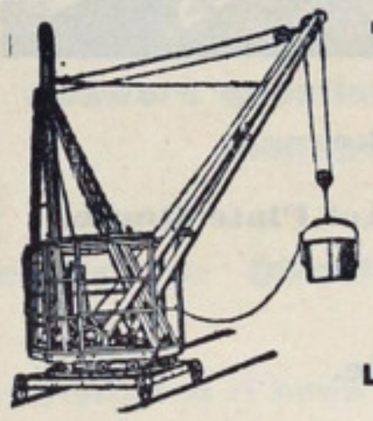

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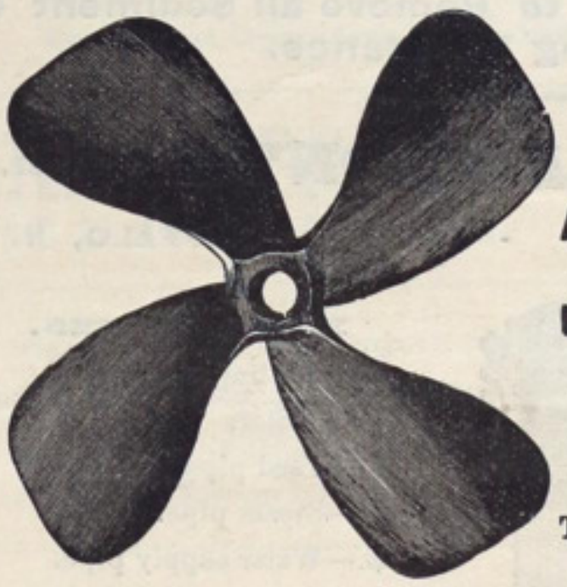

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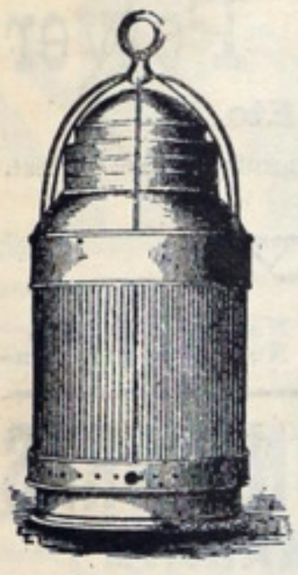

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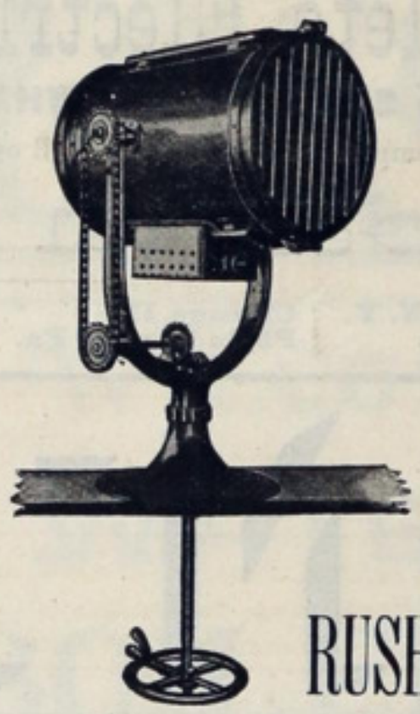

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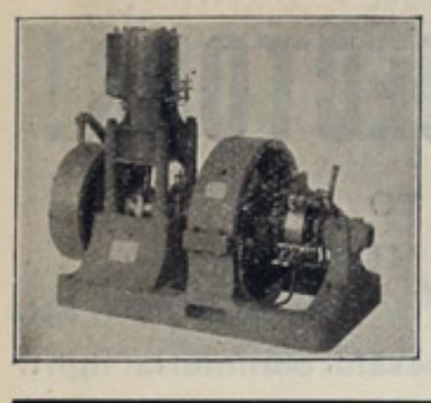

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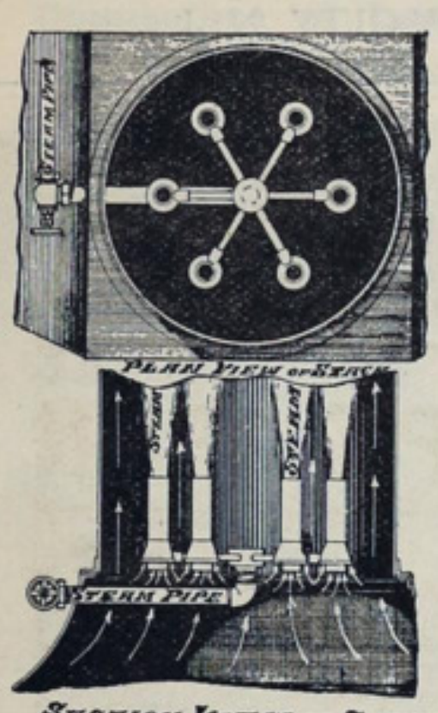

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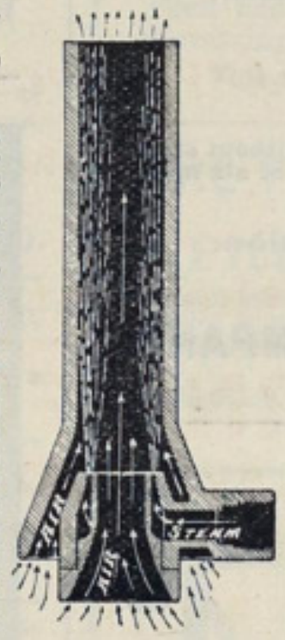

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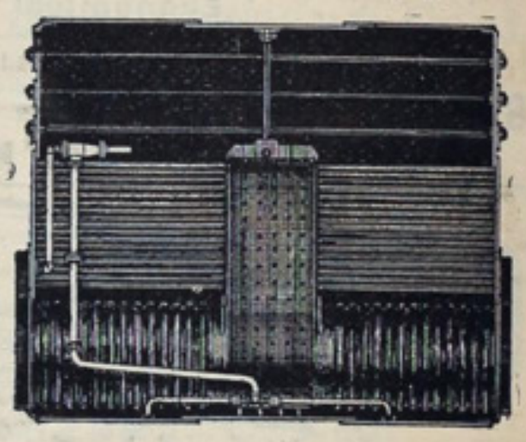

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LOW RATES to Picturesque Mackinac and Return, including Meals and Berths. From Cleveland, $18; from Toledo, $15; from Detroit, $13.50.

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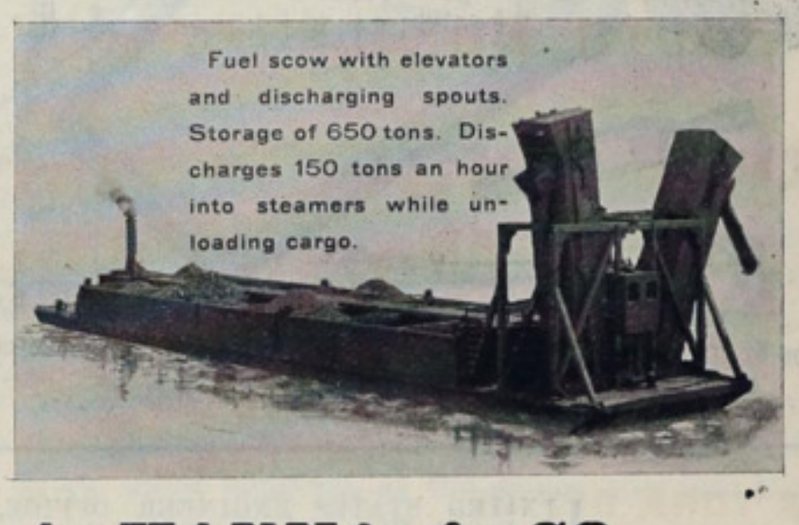
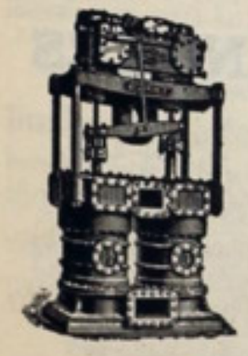

Fuel scow with elevators and discharging spouts. Storage of 650 tons. Discharges 150 tons an hour into steamers while unloading cargo.

M. A. HANNA & CO.,
Main Office, Perry-Payne Bldg., Cleveland. Miners and Shippers.

UNITED STATES ENGINEER OFFICE, 366 Milwaukee street, Milwaukee, Wis., Sept. 1, 1896. Sealed proposals for dredging 70,000 cubic yards, more or less, at Menominee River, Wis., and Mich.; 200,000 cubic yards, more or less, at Green Bay Harbor, Wis., will be received here until 12 o'clock noon, Oct. 6, 1896, and then publicly opened. Information furnished on application. GEORGE A. ZINN, Capt. Engrs.
Oct. 1.

THE GEO. F. BLAKE MFG. CO.



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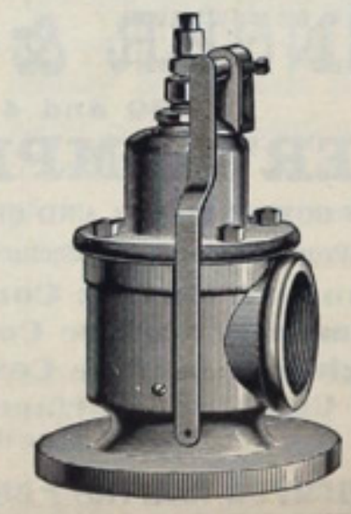

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Manufacturers of all kinds of Pressure and Vacuum Gages, Water Gages, Gage Cocks, Radiator Cocks, and other Engine and Boiler Fittings and Supplies.
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LEADING SHIP CHANDLERS AND SUPPLY HOUSES.

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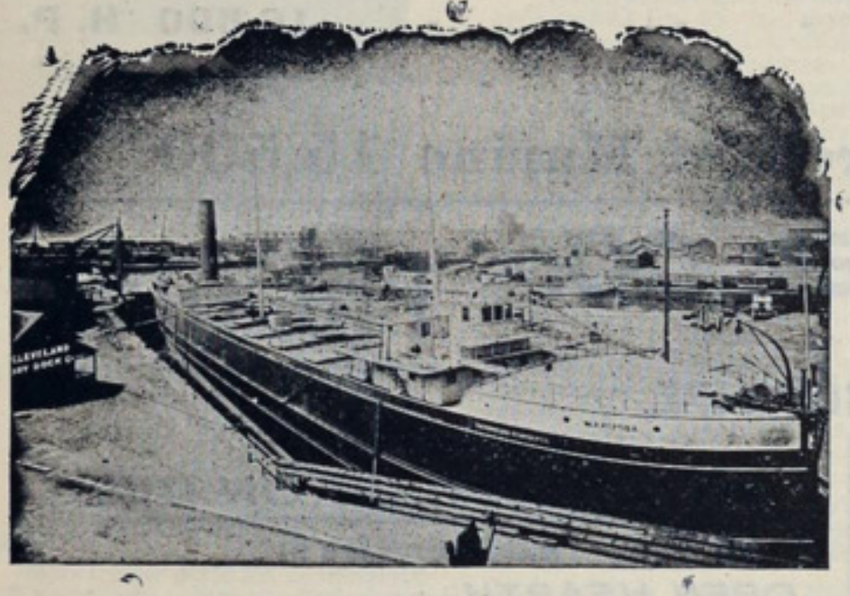

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Resid. 'Phone 4080.

REPAIRING A SPECIALTY.

Dimensions of Dock:

Lth. over all, 360 ft.
Lth. on blocks, 340 ft.
Width of gate, 50 ft.
Depth over sill, 20 ft.

Capt. W. W. BROWN
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IRON OR STEEL FORGINGS FINISHED COMPLETE, ROUGH MACHINED OR SMOOTH FORGED ONLY, OF ANY WEIGHT.
COUPLING LINKS AND PINS. PRESSED WROUGHT IRON TURNBUCKLES. CAR IRON SPECIALTIES.

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Of all classs built on the Shortest Possible Notice at our yards at

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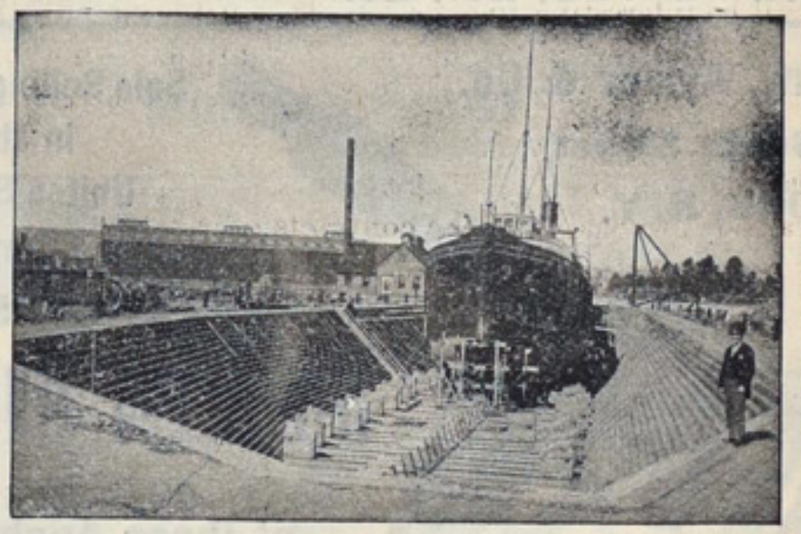
Photograph of 300 ft. Boat in Dock.



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Best Quality of Oak instock for Repairing Wooden Vessels of all Classes.

SIZE OF DOCK.

Length, extreme	537 feet.	Entrance, Top	55 feet 9 in.
Breadth, Top	90 " 4 in.	Entrance, Bottom	50 "
Breadth, Bottom	52 "	Depth over Sills	18 "

LARGEST DRY DOCK ON THE LAKES.

Prices for Repairs and Docking same as at lower lake ports

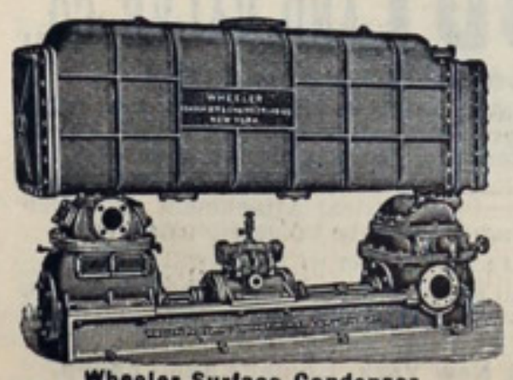
SUPERIOR, WIS.

A number of Propellor Wheels in stock at Dry Dock.

UNITED STATES ENGINEER OFFICE, Duluth, Minn., Sept. 20, 1896. Sealed proposals for rip rap embankment at Agate Bay (Two Harbors), Minn., will be received until noon, Oct. 20, 1896, and then publicly opened. Information given on application. CLINTON B. SEARS, Maj., Engrs. Oct. 17.

WHEELER CONDENSER & ENGINEERING COMPANY,

39 and 41 CORTLANDT STREET, NEW YORK.



Wheeler Surface Condenser.
Mounted on Combined Air & Circulating Pumps.

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MOUNTED UPON COMBINED AIR AND CIRCULATING PUMPS.

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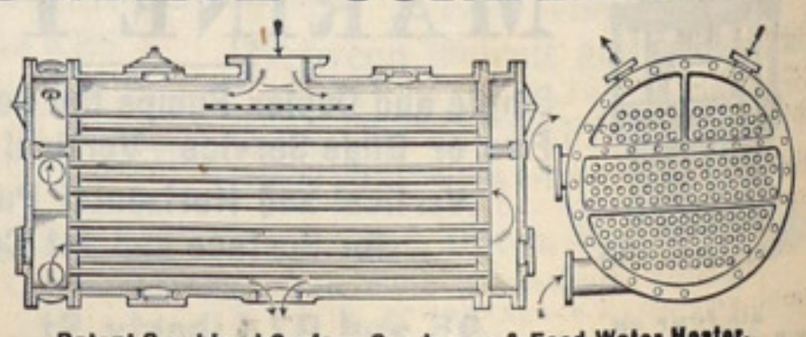
Wheeler Standard Surface Condenser.
Wheeler Admiralty Surface Condenser.
Wheeler Lighthall Surface Condenser.
Volz Patent Combined Surface Condenser and Feed Water Heater.

Wheeler's Improved Marine Feed Water Heater.



Patent Combined Surface Condenser & Feed-Water Heater.